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SEPTEMBER, 1942

Industrial FINISHING

Published Monthly in the Interest of Modern Production Finishing

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Army Air Corps
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Indianapolis, Indiana
THE LILLY COMPANY, High Point, North Carolina

Marine Corps

THESE INSIGNIA are displayed here as a tribute to our hard hitting and fast growing armed forces, whose stinging blows have already been felt by our enemies at Wake, Bataan, Coral Sea, Midway and now the Solomons. And Boys, when you strike next, **make it sting more than ever.**

NOW You Can Wash 'Em Down

With Any Kind of Gas!

. . . New Protective Cable Coating Withstands the Attack of Aromatic Gasolines.

SOAKED IN 100 OCTANE GASOLINE . . .

After only 24 hours, a standard ignition cable coating has allowed penetration of fuel through the film—rubber insulation is partially dissolved and swollen to such an extent that cotton braid and lacquer film has burst. Roxalin's new high tension ignition cable coating is unaffected after 10 days immersion.

ON distant battle fronts, motors may have to be cleaned of grease and oil with any solvent available. If only high octane gasoline is at hand it would rapidly penetrate conventional ignition cable coatings. Insulation braid and rubber are soon destroyed and complete rewiring of the ignition system becomes necessary.

Roxalin's new high tension ignition cable coating helps keep 'em flying because it is insoluble and impermeable in high aromatic motor fuels. This is accomplished without sacrificing its outstanding resistance to high and low temperatures.

A new cable coating probably is not your finishing problem. We cite this Roxalin development because we feel it is typical of the service you can expect if you will give your specific finishing problem to our laboratory.

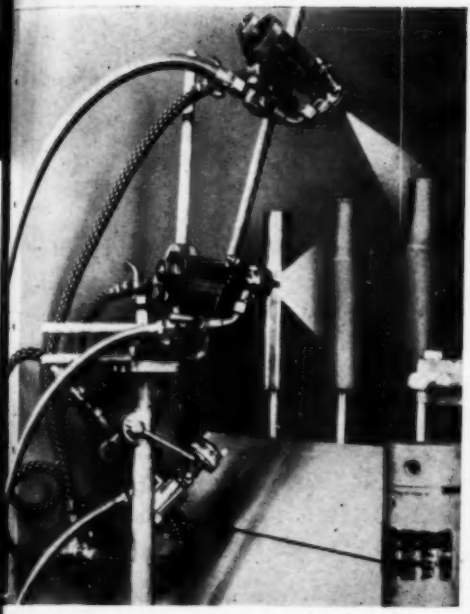
ROXALIN *Flexible* FINISHES
INCORPORATED
ELIZABETH • NEW JERSEY

Photo courtesy United Airlines

"FACTS ABOUT GOVERNMENT FINISHES"

You will find our file folder "Facts on U. S. Government Finishes" an invaluable source of information on most of the Army and Navy specification finishes. A set is yours for the asking — write, we'll send it by return mail.

WATCH ROXALIN IN AVIATION



Coating STEEL SHELL CASES

Another Job Made Easy by Paasche Airpainting Equipment

The current change-over from brass to steel shell or cartridge cases brings on a new finishing problem, for now a protective coat must be applied to both interior and exterior surfaces of the steel cases. Paasche engineers have taken this problem in stride. They have designed automatic airpainting units that finish thousands of cases per hour, applying uniformly perfect finishing that has passed most rigid tests. Again Paasche has accepted the challenge and smoothed the way to increased production.

If you are manufacturing steel shell cases or any other products for war that require coating, you will find Paasche Automatic or Manual Equipment can do the job at record speed. Our engineers, too, are ready to help you find a way to do Freedom's job better and faster. Write for complete information on Paasche equipment — get latest bulletin F3-42.

Get this Paasche CUB High Production Air Brush. It is the gun you need for Wartime Finishing. Its light weight and strength saves time and cuts costs through its highly efficient operation. Get the facts in bulletin FM8-42.

Paasche Airbrush Co.

1917 DIVERSEY PARKWAY
CHICAGO, ILLINOIS

LIKE THE FIGHTING MAN,

FINISH MUST BE FIT, TOO

THE fighting man must be the flower of his country's manhood, must be brought to high physical perfection, clothed, fed and armed with the best. Only thus can he deliver the punch that wins. And the finish that protects his weapons must be fit, too.

Finish for military equipment must be perfect right up to the end. That shell must fire at its highest efficiency; that glider or plywood plane must not be damaged by moisture; rust and corrosion must be fought as bitter enemies. That's why the Government sets such high standards for finish—his weapons must measure up to the fighting man, they must not fail at the crucial moment.

Zapon finishes for government work not only rigidly adhere to the specifications, they often exceed them. All down the finishing line, we must see to it that the finish does not fail.

ZAPON

ZAPON DIVISION · ATLAS POWDER COMPANY

Eastern Sales: Stamford, Conn. *Western Sales:* North Chicago, Ill.

INDUSTRIAL FINISHES

EIGHTEENTH YEAR OF PUBLICATION

Industrial FINISHING

Reg. U. S. Pat. Office

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Contents of This Issue

Letters from Readers of Industrial Finishing ---- 4
New Protective Coatings for Our War Products ---- 12
Specification Finishes ---- 17
Cleaning New Steel Pipe ---- 20
Our Experience With Women Finishers ---- 23
Foreman Finisher Urges Cooperation Between Finish Supplier and User ---- 26
Infra-Red Reflectance of Paints ---- 28
Surface Treating New Plywood for Durability (Part 2) ---- 66
New Materials, Supplies, Equipment ---- 72
Questions; Answers ---- 82
Editorial ---- 92
"Classified Advertising" Section ---- 103
Advertisers Index ---- 104

Blast-Cleaning Shells ---- 19
Joins Detroit Rex Products ---- 19
How Much in Drum ---- 22
Ruth Hammond Joins Army ---- 22
Color Illusions and Magic Free ---- 64
M. H. Corbin Promoted by Standard Varnish Works ---- 64
National Safety Exposition ---- 70
Matches Steel Line in Wood ---- 80
Ship Wheels ---- 89
Testing Cleanliness of Metal Parts ---- 90
Director of Engineering for Fostoria ---- 90
Vinylite Resins Booklet ---- 97
Makes Glue Go Farther ---- 97
Spray-Painting Moldings a Different Color ---- 98
Linseed Oil Coating Prevents Rust ---- 100
Secret of Coating Small Parts ---- 100
R. F. Ohmer Now Colonel in U. S. Army Air Forces ---- 101
Production Furniture Finishing ---- 102
Degreasing Solvent ---- 103
Films of Grand Rapids Convention ---- 103
R. H. Clinton Joins Army Air Corps ---- 103

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Letters from Readers...

OF INDUSTRIAL FINISHING

These letters (and many others) were answered recently by the editorial department, but are published here to reveal certain interesting trends of desire and activity in the industry, and to encourage additional inquiries, comments and suggestions. Further information about any of them can be obtained by writing this office.—Editor.

Nails for Plywood

Your July issue carries an article entitled "Plywood in Ship Construction" which makes reference to a new type of nail that is replacing screws and which seems to give better satisfaction. Your article mentions that the nails, when once driven, cannot spring loose.

We are interested in this new type of nail and would appreciate your giving us information as to the manufacturer of this item.—R. S. Co.

Our correspondent, after numerous inquiries, has learned that this nail is called "Anchorfast Monel," and is made by the Independent Nail & Packing Co., Bridgewater, Mass.—ED.

Plywood Waterproofer

The writer has just read the article in your July issue entitled "Plywood in Ship Construction" relative to the practice and possibilities of using penetrative water-proofing sealer treatments for the outer surfaces of plywood that enter into the manufacture of war products.

This article suggests to us the need of waterproofed Liquafill Size to protect the outer ply in the similar manner in which Liquafill Size has been in use for the past 12 years as a sealer for eliminating checks and preventing the absorption of finishing materials on difficult end-grain panels and pieces.

Waterproofed Liquafill Size would act as a prime sealer in such cases and any type of finishing materials could be applied over it with successful results.

Normally we have been selling Liquafill Size for sizing difficult surfaces, such as has been suggested, for instance, on page 38 of August 1938 INDUSTRIAL FINISHING and again on page 65, May 1939 INDUSTRIAL FINISHING. However, we feel that now it is entitled to its place in the war effort. —The Liquafill Mfg. Co.

Chair Finishes

On page 62 of August 1942 issue, you have an inquiry about "Chair Finishes" from a company in Mexico. We are specialists on these finishes and would appreciate it very much if you would put us in contact with this company so that we can forward them any samples they may require for their chair finishes.—THE LAWRENCE-MCFADDEN CO.

Information given.—ED.

Graining Ground Coat

We would like to obtain a vehicle to use in connection with a graining operation over a lacquer ground coat. In practice, the operation consists of applying mottling and overgraining by means of brushes. The problem that confronts us is to obtain a material

DOLAN WAR FINISHES

for WOOD and METAL

Olive Drabs ★ **Rot Inhibiting Primers**
Lustreless Enamels ★ **Battleship Grays**
Shell Lacquers ★ **Airplane Dopes**

If you are figuring on Government contracts with the Army, Navy, Air Corps or any branch of service—we are equipped to furnish the finishes according to Government specifications. Our staff of Laboratory Technicians is familiar with all problems and its services are available for the asking.

Also Still Available

DU-BAR BLEACH ★ **FABRI-CLEAN**
For modern light-tones **The magic Fabric Cleaner**

V. J. DOLAN & COMPANY, INC.
Mfrs. of "Unquestionable Quality" Industrial Finishes
1830 N. LARAMIE AVENUE CHICAGO, ILLINOIS

Conservation Improves Finish on Furniture

—ONE COAT—
PERFECTION SYNTHETIC **VARNISH**
LOOKS LIKE TWO COATS LACQUER

SURE! You can pack next day!
NO! It won't PRINT.
YES! It will DULL RUB or take HIGH POLISH.
NO! "Positively No" BLUE HAZE After Rubbing.

WATER-PROOF • LIQUOR PROOF • MAR PROOF • ECONOMICAL
DURABLE AND OBTAINABLE

Available in a Full Range of Sheens

PERFECTION PAINT & COLOR COMPANY
INDIANAPOLIS, INDIANA

PASSED AND APPROVED!

Our Rust Inhibiting Primer No. 23696 and Lustreless Olive Drab No. 23680

Have been approved for U. S. Government specification finishes after undergoing rigid and exhaustive tests.

Can be brushed or sprayed, air dried or baked and will fit into any production schedule.

Manufacturers of equipment, with specifications that require these protective coatings, are invited to write us for liberal working samples, prices and delivery dates.

LACQUERS
THINNERS
ENAMELS
METALIZED FINISHES
SYNTHETICS

UNITED LACQUER MFG. CORP.
General Offices and Factory: Linden, New Jersey
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I. C. D. FORMULA NINE
NON-INFLAMMABLE
« *wax free* REMOVER »

for paint, varnish, lacquer, baked enamel, adhesives

EASY TO APPLY—NO AFTER-CLEANING

PROMPT DELIVERIES

I. C. D. FORMULA 9 is the standard of safety and quality . . can be sprayed or brushed . . doesn't raise grain nor discolor . . quickly removes all kinds of finishes and coatings . . costs less to use . . saves time, labor and material.

SPECIALTY COATINGS—I. C. D. Labs. have specialized in the formulation and manufacture of non-inflammable coatings and substitute finishes. If you have a tough coating or finishing problem send in your specifications, finishing schedule and requirements. Immediate action and a prompt reply promised.

INDUSTRIAL CHEMICAL DEVELOPMENT CORP.

that can be dyed to the proper shade and then be applied by brush in such a manner that the work blends out so as to produce a buried effect. We had better add that first of all a walnut grain effect is laid upon the lacquer ground coat before the overgraining we have described is done.

Can you supply us with the name of a manufacturer who might be familiar with what we are after? We will appreciate any help you can give us in this matter.—J. Casket Co.

Tumble Finishing

A couple of years ago you had an article in your publication about tumble finishing, written by Mr. Fairburn of Zapon Co. We would like to get a copy of this article if it is at all possible.—B. Varnish Co.

This article appeared in Sept. and Oct. 1941 issues of INDUSTRIAL FINISHING. A reprint of the 2-part article is being sent to you.—ED.

Phenolic-Resin Glue for Plywood

In your August issue of INDUSTRIAL FINISHING, on page 22, you show a photograph of an operation of spraying phenolic-resin glue on veneer. We would like to have some information on this subject, as we are going into the manufacture of wood plane parts. Will appreciate your advising where additional information can be obtained. —M. Furn. Co.

We are referring you to several manufacturers of phenolic-resin adhesives.—ED.

Buffing Wax Wanted

We want a white-base buffing wax suitable for finishing agricultural tool handles and mop handles. We desire a wax that will produce a gloss after the handle has been dipped in one coat of semi-lacquer rubbing material. Would you kindly suggest, from your list of advertisers, several people whom you think might be able to serve our requirements in the above respect?—S. Handle Corp.

Likes Boynton's Article On Fumed Oak

I am an aircraft finisher with the U. S. Government, and I wish to congratulate Mr. F. R. Boynton on his article about "Fumed Oak Finishes"

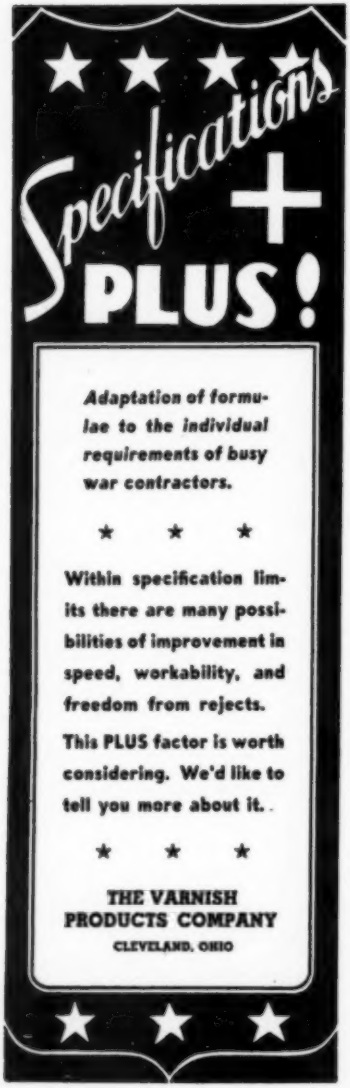
Re-Creations of
RARE WOODS & MARBLES

Don't let material shortages "restrict" the sales-appeal of your product! Investigate Sans-Arb and Sans-Marb, Meyercord's flawless photo-lacquer re-creations of imported and domestic wood grains, burls, crotches, marquetry and exquisite, vari-colored marbles.

Sans-Arb and Sans-Marb can be cut to dimension and applied to virtually any surface, flat or molded. Their ease of application, high drying speed and surface equivalent of several coats of lacquer (can be rubbed, sanded and top-coated) are proving important factors in wartime finishing. Let Meyercord field engineers demonstrate the substantial savings in finishing operations and materials—plus the lustrous new product beauty — possible with Sans-Arb or Sans-Marb.

Write Dept. M for samples and full details.

THE MEYERCORD CO.
5323 West Lake Street • Chicago, Ill.


Specifications
+
PLUS!
Adaptation of formulae to the individual requirements of busy war contractors.
★ ★ ★
Within specification limits there are many possibilities of improvement in speed, workability, and freedom from rejects.
This PLUS factor is worth considering. We'd like to tell you more about it.
★ ★ ★
THE VARNISH PRODUCTS COMPANY
CLEVELAND, OHIO
★ ★ ★

in August issue. The part that interests me most is where he explained about the treatment of second growth lumber. Most good color men will catch this point, especially where he explains the red and sap spots in oak. I have run across this trouble several times in color matching, and I find that the older oak has a deeper red or flat red. The younger wood has more white sap and is softer. I find that by giving these parts just the right type of treatment next to the bare wood, before you do the staining job—this gives you a more clear and uniform color. But if you do not give this treatment before staining, you will find yourself with extra work on hand, such as tanning, blending, etc., and this does not always turn out a clear and uniform job, and high humidity will make a hazy mist in the finish.—F. J. GREEN.

Sprayed Plated Finish

Will you please give us the name of the manufacturer who has a product that serves satisfactorily as a sprayed plated finish?—X. Co. (Show Cases).

In a short article of your July issue of INDUSTRIAL FINISHING there appeared some mentioning of a "Sprayed Plated Finish," but there was no clue to the manufacturer producing same. Will you please give us this information?—M. Co.

Information supplied.—ED.

Automatic Spray Machines

We would appreciate your advising us the names of manufacturers who produce automatic spraying machines. We have a government contract for 150,000 wooden boxes that must be sprayed inside and outside. We would like to have both of these operations done automatically at one time.—B. B. Co.

Finishes for Glass

We note your letter entitled, "Lacquers, Enamels for Glass", signed "S. L. Co." on page 4 of July issue of INDUSTRIAL FINISHING. We do not manufacture the lacquers, but we do apply such special finishes to all types of glass containers and parts, by what is known as our Coloroid Process. If you are interested in having work done along this line, or glass parts finished up in various colors and in quantities, we may be in position to help you out. We will be glad to go into more detail if you are interested. — Double Duty Products, Inc., Cleveland, Ohio.

THE DETERMINED RUSSIAN SOLDIER SAYS:

(TRANSLATED)

"DRIVE OUT THE GERMANS"

Russia has surprised the world by the strength and heroism of her resistance . . . a united nation fighting with and for the United Nations!

We can take a lesson from Russia's determination and spirit, and with equal determination resolve to stick with the job until it is finished.

THE **STILLE-YOUNG** CORPORATION

MANUFACTURERS OF PROTECTIVE COATINGS *THAT REALLY PROTECT*

GOVERNMENT SPECIFICATION MATERIALS . . . FOR ALL PURPOSES

LACQUERS, FILLERS, STAINS, ENAMELS, PAINTS

CHICAGO

FAMOUS

GENE SARAZEN'S GREATEST VICTORY!

FLUSHING, L.I., JUNE 25, 1932 — AFTER TWO DAYS' PLAY OF 18 HOLES EACH FOR THE THIRTY-SIXTH NATIONAL OPEN CHAMPIONSHIP, ***GENE SARAZEN*** ENTERED THE FINAL DAY'S 36-HOLE TEST FIVE STROKES BEHIND THE LEADERS. BLAZING HIS WAY TO THE FRONT AT A PACE NEVER SEEN BEFORE IN THE NATIONAL OPEN, SARAZEN SHOT THE LAST 28 HOLES IN AN EVEN 100... THE FINAL 18 IN A SENSATIONAL 66, THE LOWEST SINGLE ROUND EVER SHOT UNTIL THEN IN THE NATIONAL OPEN, TO OVERCOME HIS HANDICAP AND WIN WITH A 3-STROKE MARGIN IN ONE OF THE MOST STIRRING AND DRAMATIC ***FINISHES*** OF ALL GOLFING HISTORY!

PITTSBURGH

FINISHES

YOU'LL BE AHEAD AT THE FINISH

IF YOU STICK TO PITTSBURGH QUALITY!

PITTSBURGH QUALITY HAS NOT SUFFERED FROM THE EXTRA DEMANDS OF WAR-TIME PRODUCTION. NOW AS ALWAYS, EVERY FINISH MUST PASS THE MOST EXACTING TESTS TO PROVE ITS RIGHT TO BEAR THE PITTSBURGH LABEL. PITTSBURGH'S TECHNICAL MEN ARE IN ALL PARTS OF THE COUNTRY HELPING AMERICAN INDUSTRY DEVELOP THE BEST AND MOST EFFICIENT FINISHES FOR EVERY KIND OF WAR PRODUCTION. A PHONE CALL, WIRE OR LETTER WILL BRING A PITTSBURGH REPRESENTATIVE, PROMPTLY, FOR CONSULTATION.

PITTSBURGH PLATE GLASS COMPANY

INDUSTRIAL PAINT DIVISION • PITTSBURGH, PA.

FACTORIES - MILWAUKEE, WIS.; NEWARK, N.J., HOUSTON, TEXAS, LOS ANGELES, CAL., PORTLAND, ORE.

THE THRESHER VARNISH COMPANY .... DAYTON, OHIO

Industrial FINISHES

New Protective Coatings

By C. A. Lankau
and Ben Popper

THE WAR has caused many changes in industry and its products. The time has come when we are all in the war. In changing over from civilian business to war business, many interesting things have transpired. These changes have introduced new products and methods.

People who were engaged in the manufacture of lingerie buckles, fasteners, etc., or suspender, brace and garter parts, are now making gas-mask buckles, belt buckles, hooks, etc., for military service or for civilian defense. In view of the metals conservation program, these articles are made from the least strategical materials that will give the desired results.

Previously these items were made of brass. Concurrent with the brass shortage, they were changed to steel which was oxidized as a rust-preventive measure. Occasionally an order still comes through calling for brass because the articles are needed for use under conditions where the painted oxidized steel will not be satisfactory. This necessitates a careful watch of the finishing materials used to coat the products, to make sure that the formulation is satisfactory for the various changes in the base materials.

Prior to the "Industry in the War" business there were few concerns who could satisfactorily coat these small objects in large volume economically, using semi-glossy or lusterless materials. Today it is being done on a large scale, at a very low cost, with the aid of a centrifugal drying machine. And it is being done with flat pigmented materials, with satisfactory results, too. This is an achievement of science in the coatings industry as it joins "Industry in the War."

Small Articles Coated in Whirling Machines

The articles are finished in the same manner as clear and colored lacquers have been applied by use of the centrifugal machines in the past. A more careful control of the viscosity, time between dipping and spinning, time of spinning, and rate of withdrawal and spreading out on trays, is necessary with the pigmented materials. In the case

for Our War Products

of the flat materials, additional precautions should be taken to be sure to avoid settling of the pigment and flattening agent, which naturally causes variation in gloss. This is accomplished by frequent agitation of the material while it is being used.

Materials are being made which give excellent adhesion and coverage in one-coat application by this method. In some cases, where it is desirable to cover up the marks caused by overlapping pieces in the basket or on the drying tray, a light spray coat is applied on the face side only. This gives a satisfactory finish from the standpoint of appearance, adhesion and durability.

From Civilian to Modern War Products

Firms engaged in the manufacture of metal articles, public streetlight fixtures, and even jewelry and jewelers' equipment, have converted their facilities to make many products for war. Among these are airplane landing lights, cabin fixtures, airport landing-field lights, etc. The reflectors of these lights must be very effective in order to place the maximum light where it is required, and to still retain the maximum brilliance. They must be protected against corrosion and other atmospheric reactions which would render their surfaces somewhat dull. The lights used are necessarily of high power, which generates considerable heat; consequently, the protective coating used to prevent tarnishing of the reflectors must withstand high temperatures.

The usual baking finishes of the urea type, which are sufficiently light in color to retain the brilliance of the polished metal, may withstand the extreme heat test and yet have the required color retention. However, under the prolonged conditions of high temperature, weather conditions and strong light, they tend to break down and darken with age. In addition, many of these manufacturers are not equipped with baking facilities and are not easily converted to such a schedule. Therefore, it is highly desirable to have an air-drying finish that will fill all of the requirements. The coatings industry has developed such a material which meets all the needs.

Air-Dry Finish Developed

This material was developed to a useful stage quite some time prior to the outbreak of the present war. Unfortunately the type of solvents

required existed only in the low-boiling or highly volatile group and in the high-boiling or slow-evaporating types, with no medium boiling grades. This led to poor solvent balance which could not be avoided due to the nature of the coating material and the availability of the correct type of solvents.

In addition, the high percentage of low-boiling solvents required for satisfactory solution and viscosity rendered the finished product susceptible to blushing. The addition of retarders or slow solvents aided somewhat in reducing the blush under conditions which were not too extreme and not much above normal humidities, but they were far from satisfactory in midsummer conditions, particularly along the seaboard where humidities often approach complete saturation.

New Solvents and Better Solvent Balance

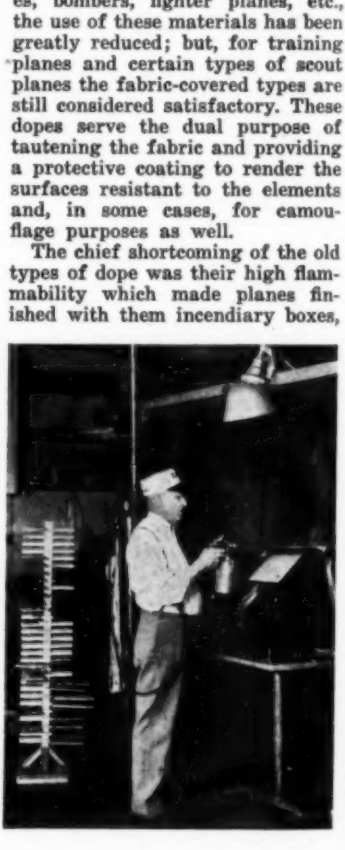
Great strides have been made since the outbreak of hostilities, by the introduction of new solvents, on a commercial scale, which fill the gap and enable the reduction in the amount of low-boiling solvents needed for this type material. Better solvent balance is obtained and the coatings industry, through its diligent research, has developed materials with the same film characteristics as heretofore, but with a decided improvement in blush resistance and flow characteristics.

In this respect the new material now approaches the conventional nitrocellulose lacquers. Still further developments are being carried on to improve the adhesion and flexibility characteristics, which have never been considered too good when compared with the regular lacquer types used directly on highly polished metal surfaces.

Great Improvement in Aircraft Wing Dopes

Another need of the war program, which has resulted in the development of new and better coating materials, is that of a better and more satisfactory line of wing dopes. These materials are used for tautening fabric used in airplane wings. With the introduction of the all-metal flying fortresses, bombers, fighter planes, etc., the use of these materials has been greatly reduced; but, for training planes and certain types of scout planes the fabric-covered types are still considered satisfactory. These dopes serve the dual purpose of tautening the fabric and providing a protective coating to render the surfaces resistant to the elements and, in some cases, for camouflage purposes as well.

The chief shortcoming of the old types of dope was their high flammability which made planes finished with them incendiary boxes,



with little hope of escape should they be ignited. The War Department, in all its branches, has long recognized this fact and has specified certain newer dopes made from cellulose acetate and other non-inflammable cellulose derivatives.

The development of new solvents, as just mentioned, has made this type of wing dope not only possible but has improved it from the standpoint of blush resistance, brushing qualities and sprayability, so that it is now the preferred type of material on all of the newer Government specifications. It is furnished as a clear for tautening purposes, and pigmented for final finishing and camouflage purposes. The material is really a great contribution to the safety of the military forces. It is the development and contribution of scientists and engineers to the war program and will find much usefulness after the war.

Protective Coatings for Aircraft Plywood Surfaces

The furniture and cabinet-making industries have also entered the program and many of them are involved in the manufacture of plywood training planes. These plywood planes have found usefulness because of their strength, light weight and utility, combined with the conservation of strategic materials by saving or eliminating metals, certain fabrics, etc. The problem of supplying them with a satisfactory protective coating is not yet completed but many interesting finishes are being tested and developed by the coating industry engineers. Probably satisfactory materials will soon be introduced to compete for the coveted position of Government approval and superiority.

Some metallic casket manufacturers, as well as certain sheet-metal working organizations formerly engaged in such industries as the production of metal houses, garages, etc., as well as others, have converted their facilities to manufacture bomb shells, bomb-fins and other sheet-metal products connected with ammunition supplies or other military requirements.

Metal Product Finishes—Air-Dry and Baked

These products for war require a finishing material to protect the metal and to reduce their visibility or detection, as well as act as a mark of identification to aid the military forces to quickly and positively identify the nature of the charge which they contain. They are finished with the regular ES-680 line of materials, which gives them a non-reflective surface as well as an identifying color and sufficient protection against the elements to which they may be subjected. These materials produce an inexpensive protective coating which may be air-dried or baked according to the specification for which they are to be used.

Flattening Agents; Infra-Red Camouflage

A great deal more has been learned by the protective coating industry about flattening agents, non-reflectance and certain types of pigmentation, since the outbreak of the war than has ever been learned in a similar period. This has been fostered by the requirements of the war program and has been met by diligent research of the coatings industry and its raw material suppliers. These products are new and may be considered a direct development of the war.

The matter of inertness of pigments in infra-red photography is of utmost importance to the military forces, from the standpoint

of camouflage, but it will have as great a value to American industry, both in the war program and in the civilian industry to follow, with respect to suitability of these materials to infra-red baking. Thus a subject of research, forced upon us by the exigencies of the war, will yield information that will be useful and beneficial to private life after the war.

Protective Coatings for Substitution Materials

The substitution of many materials for new uses in order to conserve metals and other strategical goods has brought about new problems. Many relatively porous surfaces are replacing the smooth or polished surfaces to which Americans are accustomed. These range from pressed cardboard to plaster board, plywood, plastic compositions having a high percentage of fillers, and unglazed ceramic ware. They may include any other materials which have a similar type surface, even including fabric.

For many of the uses to which the finished articles are to be put, a protective coating is required. Until recently, finishes for this type of surface have been unsatisfactory. Some new developments give vast improvements along these lines. The materials range from emulsion paints to some new developments in the synthetic and lacquer field. Instead of requiring many coats of finishing material or several coats of sealers and fillers, followed by a number of finish coats, some really good-looking and highly satisfactory finishes can now be obtained in from one to three coats, depending on the nature and porosity of the surface.

Many Developments in War Products Finishes

These are just a few of the many new materials that have been developed for use on war products. They will indicate many other developments and uses which cannot be mentioned here. They will also serve to show how certain industries have converted their facilities into the war program and may suggest others.

The large number of developments of finishes for war products has been brought about as individual specific requirements, and not as a general line for military requirements. There has been much turmoil and confusion in the development and classification of these numerous finishes. Regulations, restrictions, new requirements, substitution of base materials or surfaces—all of these add to the complexity of the program.

As the new finishes for war products are catalogued and properly classified and completely tested for their full value, several interesting materials with many improved properties will result. Out of the chaos will come improvements in the finishing field beyond all expectations. These new finishes, brought about by the drastic measures required of war production, will serve industry in time of peace.

I am sending you a brief article on specification finishes. It may strike a responsive chord in you and your readers, or your judgment may disagree with the substance thereof. If you like it use it; if not, . . .

S P. Wilson

Specification Finishes

BY S. P. WILSON

FOR SOME time now, hundreds of manufacturers and their finishing staffs have been forced to get acquainted with a new development in their paint, varnish and lacquer requirements. Instead of choosing from the offered products of the trade, in accordance with their own judgment, they have been compelled, on the war materiel they manufactured, to use a finish made in accordance with government specifications.

In some respects this has simplified their problem. By using a product made under the specifications they relinquished responsibility for the outcome and were able, in many cases, to secure a lower price through the keen competition in specification finishes. However, something was lost also—and that was the previous habit of making a finish a little better than it had to be to get by. Not only the user, but the maker of finishes also is subject to the creeping paralysis of quality that comes from an understandable insistence on meeting the bare minimum of requirements in a given specification, so as to be in a competitive price basis. For a proper evaluation of this situation it may be worth while to study the background of specifications in general.

The Why and How of Paint Specifications

In the first place, these are not sacred gospel nor the immutable decrees of Medes and Persians. While in force, they are paramount and must be lived up to, but as conditions change these specifications are not only subject to corresponding change but actually they are altered to meet the conditions. They are created by scores of hard-working capable men, both uniformed and civilian, who do their best to combine the rigid requirements of the services with the availability of necessary materials and a sense of fairness to all potential legitimate makers of these items.

When a certain need arises, a specification is drawn up covering the qualities required, setting definite standards to be maintained,

outlining tests to meet, etc. Sometimes the finisher may think these detailed specifications are unnecessary and merely a mass of additional red tape, but in overwhelming percentage this is not true. There are good reasons for giving a maximum and minimum of infrared reflection on some finishes, for setting an instrument reading maximum of gloss on others instead of merely saying "flat" or "dull" or "eggshell."

Durability requirements in many items may seem excessive for combat items whose length of life is dubious, but it must be kept in mind that a basic principle of military science is uniformity, and uniform neatness of appearance of materiel is as important as that of personnel. Scaly, rusty and checked finishes violate this rule, and the surfaces require refinishing which is an expense of time and labor of the fighting forces as well as material.

An Example of Meeting Minimum Specifications

Now let us proceed from a recently issued specification. It has definite minimum requirements and it is presumed that any company's material made thereunder will meet at least this minimum. By using it the Amalgamated Gadget Corp. and Joe Zilch the finishing foreman will meet the terms of their contract for finishing 3-mm. widgets. However, under the conditions of their finishing room, an extra sweep of the gun may be needed; a certain hairline accuracy of application may be required that decreases the output per man per hour; the drying time, while within specification limits, is a trifle too slow for their particular method of handling, etc. When such problems occurred in their peacetime

finishing, the sources from which they purchased materials were called in and changes in formula were asked for and made to give a finish that met the requirements. Sometimes a more advantageous source was found with better coverage, easier spraying, tougher and better-looking products — and a change was made.

Now, what can be done if the present specification finish is on the ragged edge of the minimum, and difficulties arise? Why, much the same as before. Within the scope of a specification it is usually possible to find the margin of safety—the "plus" in the formula—that smooths out such difficulties. It may not be possible to find this at the minimum price, but only a percentage of users in the pre-war period bought exclusively on price.

Put "Plus" in the Job Instead of "Minus"

It can be safely assumed that the "plus" will cost only a trifle more and do more good than the differential cost. It is to be hoped

that because a maker's name does not go on the widget, that the maker has not lost his one-time pride in craftsmanship—and it will not be well for a manufacturer's future in post-war business if he gets the habit now of using something and poducing something that just passes inspection.

We all know that war contracts and subcontracts are taken at a close figure. Every available economy and short-cut is imperative, but in almost every case the extra cost of a slightly superior finish per unit is so infinitesimal compared to the total, and the improvement to the morale of the maker and user is so great, that it would seem well worth investigating.

Conservation of Critical Materials

It must be borne in mind that certain specifications have been drawn with an eye to conservation of critical materials, and this is in no sense a plea to use gold-plated finishes where black japans are adequate and expected. However, no matter how lowly the finish, there are degrees of excellence, and the purpose of this article is to emphasize that specifications should not cause the manufacturers and users to limit their thinking exclusively to the lower margin of quality and depend only on price for markets.

Possibly the best approach would be for each party in the deal to think, "My customer, the United States of America, is the biggest and best I'll ever have. I'll give the best I can to the job, and when peace comes I won't have any bad habits to break."

Blast-Cleaning Shells

CLEANING of materials and products before finishing often presents quite a problem, and some of the items connected with the defense effort seem to be problematical to a high degree. Ammunition shells must be cleaned inside and outside. One method that has been found especially good is the sandblast. Using a rotating-fixture, multiple-nozzle sandblast arrangement for the purpose, these shells may be cleaned automatically and at a high rate of speed, on both sides. Layouts of this kind are made available by sandblast manufacturers for shells of all calibers.

Joins Detroit Rex Products

Chester W. Smith has joined the staff of the Detroit Rex Products Co., 13005 Hillview Ave., Detroit, Mich., as research chemist in the alkali division. Mr. Smith has been a specialist in the field of electrochemistry as applied to electroplating for the past eight years. He is a member of the American Chemical Society.

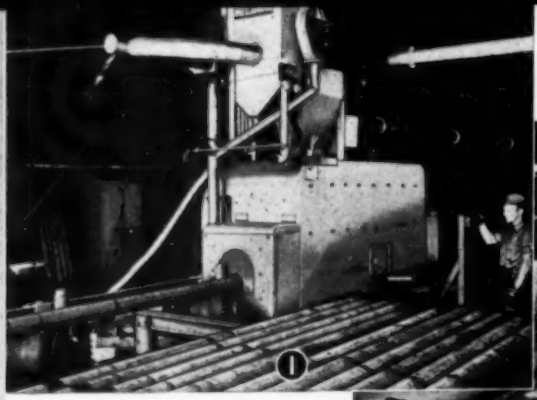


Fig. 1—Unclean pipe entering "wheelabrator" cabinet.

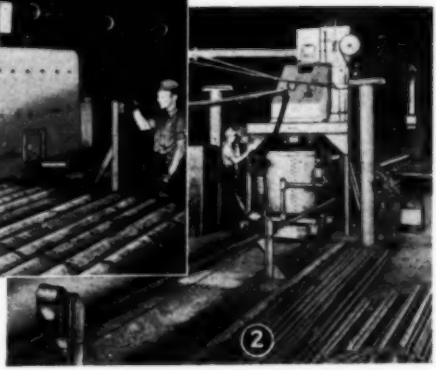


Fig. 2—Where the insides of steel pipes are cleaned.

Cleaning New Steel Pipe

IN ALMOST every manufacturing step in the production of seamless steel tubular pipe, heavy heat treat scale is formed. This has always been a vexing problem because of high cleaning costs and the difficulty of removing the scale uniformly. Very little had been done to improve this condition until the National Supply Co., Spang-Chalfant Division, Ambridge, Penna., decided to do something about it.

For many years the pipe made by this company was cleaned by an outside jobbing concern. Inasmuch as this arrangement did not afford the proper control and close supervision desired, the company determined to incorporate the cleaning operation with their other manufacturing processes.

The problem consisted of cleaning both the interior and the exterior of all "Spang" low-carbon and high-alloy seamless steel pipe, which varies from 2 to 14-in., outside diameter, and from 18 to 50-ft. in length.

A cleaning system built by the American Foundry Equipment Co. was specially designed to handle this application. The equipment includes an airless "wheelabrator" for cleaning the exterior of the pipe and an air-blast for descaling the interior.

It is difficult to give standard production figures as to cleaning speed because this depends entirely upon the size of pipe, the type of steel from which the pipe is made, and the condition of the scale due to previous heat treatments.

A cleaning production for 4½-in. standard low-carbon pipe, however, is being obtained at the rate of 18-ft. per minute for the exterior and 14-ft. per minute for the interior.

A special cabinet housing two standard "wheelabrator" blast units is used for cleaning the outside of the pipe (see Fig. 1). The "wheelabrators," mounted in the bottom of the cabinet, blast upward and in direct line with the rotating pipe as it passes through the cabinet on the conveyor mechanism. Since the distance between the "wheelabrator" and the surface to be blasted is constant for all sizes of pipe, uniform cleaning is assured.

Travel of the pipe on the conveyor rolls through the cabinet is continuous, loading being handled at one end of the cabinet and unloading at the other. As the complete length of pipe enters the cabinet, another pipe is rolled into position for entry into the blasting area. After external cleaning the pipe is automatically rolled off the conveyor onto skids preparatory to internal cleaning.

Due to the different types and sizes of pipe and the diverse scale encrustations encountered, each of which may require a slightly changed cleaning speed, the conveyor rolls can be varied as to the number of revolutions per minute and as to the skew angle. In this

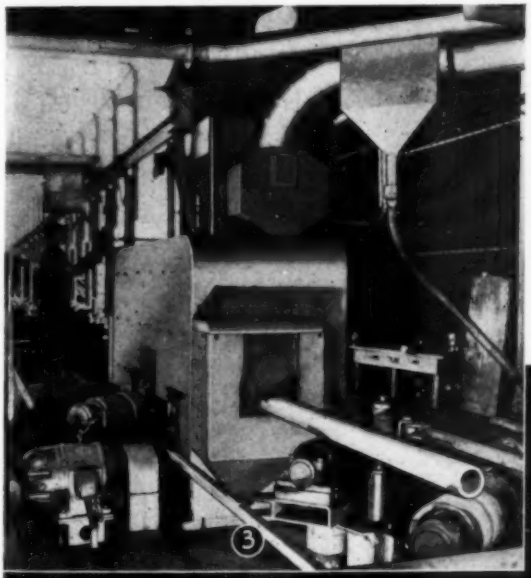


Fig. 3—Clean pipe leaving the "wheelabrator" cabinet or "blast cleaning" machine.

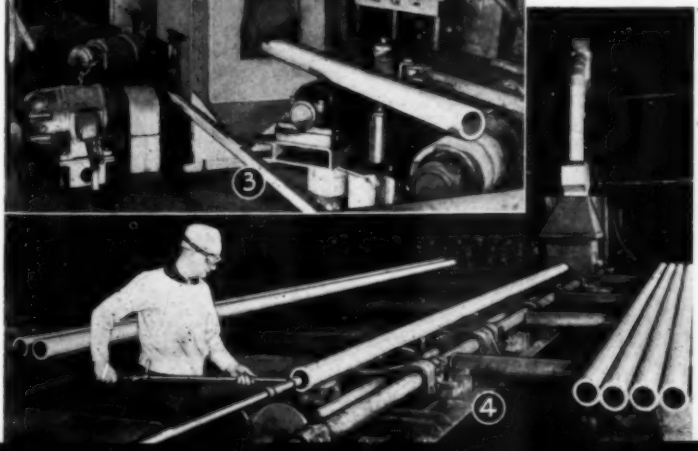


Fig. 4—Cleaning the inside of pipe by "blast method."

way it is possible to control the length of time the pipe is held in the blasting area.

In Fig. 1, a number of lengths of uncleaned pipe are in the loading position at the entry side of the machine. The pipe on the conveyor rolls has just entered the "wheelabrator cabinet" for external cleaning.

In Fig. 3 the cleaned pipe is shown being discharged. The operator is controlling the flow of metallic abrasive to the two "wheelabrator" units.

Internal Cleaning With Air Blast

The air-blast machine, specially designed for cleaning the interior of the pipe, is located adjacent to the "wheelabrator" cabinet, see Figs. 2 and 4.

As the externally cleaned pipe leaves the cabinet, it is rolled on skids to the air-blast machine where cleaning of the interior is accomplished with a lance type blast nozzle long enough to blast the entire interior surface of the long pipe.

This nozzle is inserted into the end of the rotating pipe, which is supported on revolving steel discs. Both the speed at which the pipe rotates and the feed of the nozzle can be regulated to obtain the most effective cleaning.

The air-blast tank, which controls the mixing of air and abrasive (steel grit) to the desired proportions, and the storage hoppers, are mounted on a steel car riding on a track. As the nozzle travels into the pipe, cleaning as it progresses, the whole blast mechanism rides forward, being drawn by a steel cable.

A belt conveyor, mounted under the pipe cleaning device, returns the spent abrasive from the far end of the pipe to the boot section of the elevator for recirculating in the blasting equipment.

The illustration marked Fig. 4 shows the operator blowing dirt out of the interior of a 5½-in. pipe preparatory to inserting the air-blast nozzle. The far end of the pipe fits into a metal housing which serves as a hood for air removal to the dust collector and as a catch housing for spent abrasive to be returned by the belt conveyor.

After the interior of the pipe is cleaned and the nozzle is retracted, the pipe is kicked off the discs to nearby skids, and a new length of pipe is rolled into cleaning position.

How Much in Drum

JUST to glance at a drum and you know how much material is left in it. It is being done and you do not need a pair of X-ray eyes to do it either. A remarkable level indicator has been put into use; it screws right into the faucet opening of any standard 55-gallon steel drum. The level indicator, itself, provides a second opening of threaded type, to receive the faucet. Thus, material is drawn from the drum by faucet as usual, and the indicator, just above the faucet, is always on the job.

Ruth Hammond Joins Army

Ruth Hammond, formerly Director of Public Relations for the American Furniture Mart, Chicago, Ill., and author of several furniture show articles in INDUSTRIAL FINISHING Magazine, has resigned her former position and joined the Army Air Forces. She will be a member of the immediate staff of the commanding officer in Atlantic City, N. J.

We congratulate Ruth on her fine spirit of patriotism and wish her happiness, good health and continued success.

Experience proved that the spray women worked better alongside men. The women liked spray jobs and proved quite adept at this type of work. Here is a "lefty" gunning for the top edge of a typical bit of work.

BY KARL M. SCHAAF

Our Experience With Women Finishers

ON MARCH 2, of this year, 12 men from our finishing room enlisted in the Air Corps of the U. S. Army. After being informed of this fact, our finishing foreman telephoned the personnel director and asked for replacement of these spraymen, dippers, sanders and patchers who left industry to engage in a far more vital battle. Less than a minute later this foreman was hot-footing it to the employment office to see just what the personnel director meant when he said there were no more spraymen, dippers, sanders, or patchers; in fact, no men at all were left in the company's job application file.

One hour later plans were under way for an influx of women workers into this foreman's department, the same to be trained to take the place of those men who had left and would leave in ensuing months.

Next day five women started to work in our finishing room on minor jobs. Three weeks later, 15 women were at work. The first five proved themselves so adaptable on the lighter, more repetitive type jobs (after only two weeks) that

we started training them to be sanders, dippers and sprayers. The foreman's first apprehensive forebodings were quickly dispelled by the rapidity with which the girls fitted themselves for each type job he gave them.

The next seven months saw a rapid transition from male to female labor in our finishing room. Today 80% of this foreman's employes are women and his job is not much more difficult than that day seven months ago when 12 of his best finishers left their jobs to fight for their country. Although his problems have been and still are many, none are insurmountable.

Older Employes Benefitted by Female Labor

At first the older men on the floor were quite disturbed. They believed the women would work for less money and thus lower the base rates of pay on their own skilled jobs. However, the women were given the same starting pay and used the same bonus rates as the men. They abided by the same rules of conduct, shouldered the same responsibilities, and were shown no favors over the men who worked on similar jobs. The fact of the matter is that the older men actually were moved upward as gang leaders and instructors, and in reality they benefitted by the influx of female labor.

Women No Disturbing Influence

The foreman's first fear that women would prove to be a disturbing influence on the men was quickly dispelled when upon the suggestion of the foreman, the girls got together and set up an unwritten code of clothing, speech and actions to be employed.

Where necessary, by reason of safety and efficiency, slacks were adopted as uniforms. The company provided becoming caps to protect their hair, and the foreman's suggestion that low-heeled, closed-toe shoes be worn was soon adopted. In an extremely short time the girls worked alongside the best of the men in such fashion as to even increase production rather than to slow it down.

Extra Facilities Made Necessary

An additional rest room had to be provided. It was painted white, equipped with ample seating capacity, and well lighted for the convenience of the girls. Another wash room had to be fitted out and the older ones were freshly painted.

No fore-ladies were appointed, although certain of the more easily adapted women were singled out to act as group leaders. They did much to train and supervise the new girls as they were added.

The women who were first hired proved their worth so quickly on the highly repetitive type of jobs that we quickly started them on sanding operations. We found they paid far more attention to the quality of their work on these jobs than the men had, and their output did not suffer thereby.

Problems in Training Spray Women

The foreman had a more difficult time in the training of women paint sprayers. The constant arm and body action entailed by this operation seemed to tire the girls rather quickly and two or three of them had to be trained at once, in most cases, to work in relays at the spray gun.

After about one month of gradually increasing the time spent at the spray gun, the girls were usually able to stick it out for a whole day. In most cases it took about

Turning to the mechanical features shown in this view, overhead conveyors support the revolving trays on which desks are carried from one operation to another. Thousands of government desks have been finished in our department. Women in foreground are sanding.

three months of training to equip a girl with the fundamentals and practice to enable her to keep right up to the skilled man alongside of whom she worked.

Must Rotate Girls on Dipping Operations

Our most difficult job was that of training the girls for dipping. The natural fastidiousness of the sex caused most girls to shy away from this type of job. The fumes of solvents in the dipping materials were exceedingly nauseating to some of them. The impossibility of keeping their hands well manicured, while being subject to strong paints all day, proved a deterrent. Clothing losses, too, were quite extensive.

We provided special material to be rubbed into their hands for protection, and inhalator masks to be worn to exclude the strong solvent odors. An extra pay allowance of about 25%, more than paid for the clothing ruined on this type of work. Even now, however, we must rotate the girls on the dipping jobs to keep them satisfied.

Hail to the Women!

Yes, our foreman today is more than pleased with the women who are taking the place of men who are away to war. Neither the quality nor the quantity of work has suffered. He finds them tractable and not inclined to move from one company to another in search of more pay. His absentee and tardiness reports have been no worse than before. He finds them patient and loyal and has nothing but high praise for these women who are fighting at home for the men who are fighting at the front.

FOREMAN FINISHER URGES COOPERATION BETWEEN

Finish Supplier & User

Based on some difficulties we have had lately and from statements of visiting finishing material salesmen, I have written this article . . .

I am going through precisely the same experience of 1919 and 1920. Because of those experiences I am able to guard, in part, against their repetition at the present time. We buy all of our finishing materials from one source—about 12 carloads a year. This source is familiar with our operations, yet they have sent us enamels inadequate in opaqueness, and varnish that varied in gloss and turned seedy. Because we were not previously notified of changes in formulation, the results were costly to us and to the supplier who made part of it good at his own loss.—THE AUTHOR.

BY T. J. PIRRUNG

PROPER cooperation between the manufacturer and consumer can help to prevent, defer or cushion a shock that may come soon—namely, a serious shortage of finishing materials and their metal containers.

The manufacturer is having difficulty in securing steel drums and 5-gallon cans; also, basic materials for sealers and lacquers and ingredients used in the manufacture of varnishes and enamels.

As a result, the components of finishing materials are undergoing frequent and various changes. The identity of many materials is disappearing. Their replacements may or may not suffice.

Substitutions; Changed Methods; Take Time to Test Results

This transition is certain to affect the output of manufacturers using finishing materials. Methods and processes will have to be altered. Delays will occur, especially if the user of finishing materials does not have ample warning in time to test and try what replacement materials the manufacturer has to offer. There is also the serious possibility that the resultant finished product may not suit the requirements of the ultimate consumer.

During the first World War, substitute materials used in the manufacture of varnish, in many cases, produced wholly unsatisfactory results. In some cases, varnish applied on furniture in winter months, apparently suitable in all respects, softened during the humid months of July and August and articles that had given several months of satisfactory service suddenly became unfit for use. No one considers a repetition of this trouble

as being possible, because there has been too great an advancement in chemical knowledge. However, equally serious, although totally different difficulties, not now foreseen, may develop. The present method of applying finishes on a conveyor system, and the use of limited forced-drying, may be seriously disrupted.

No Accepted Standards in Product Finishing

It is unfortunate that there are no accepted standards, especially in the furniture industry, for the kind, use and application of finishing materials. There is a great variation in the operation of conveyors and in the time and temperatures allowed for drying. Each manufacturer has his own system, developed through his own experience, to suit the type of product he finishes, the volume of his output and the floor space available. Material that may finish perfectly in one case may be wholly inadequate in another.

When the supplier has detailed knowledge of the requirements of a customer he is in a position to meet these requirements or to notify the customer of new limitations. Many users have found suitable materials by the process of trying a great variety and, from the group, selecting the most suitable. They are certain to be affected as changes occur, as they again must use the try method, unless they provide the manufacturer with complete and minute details of their requirements and expectations.

How Finish Manufacturers Can Help Their Customers

The finishing material manufacturer can help to minimize all bad effects and delays that may result from changing materials by notifying the user when changes are made. This notification should embody complete information as to any variations in the new material in comparison to the original, such as body, viscosity, adhesion, clearness, drying time and drying temperature, plus any needed circulation with humidity requirements.

Inasmuch as "Necessity is the mother of Invention", a number of improved materials will be the eventual result. However, during the transition period there is likely to be many cases of dissatisfaction. We are all too prone to accept changes as entirely satisfactory before they are completely proved. Another fault is to exaggerate the qualities of new products, or to emphasize certain qualities and ignore others.

How Finish Users Can Help Their Suppliers

The user can help the manufacturer by assisting in getting the maximum use and turnover of steel drums by—

1) Prompt return of empty drums.

2) Maintaining a balanced stock of materials—adequate but not excessive.

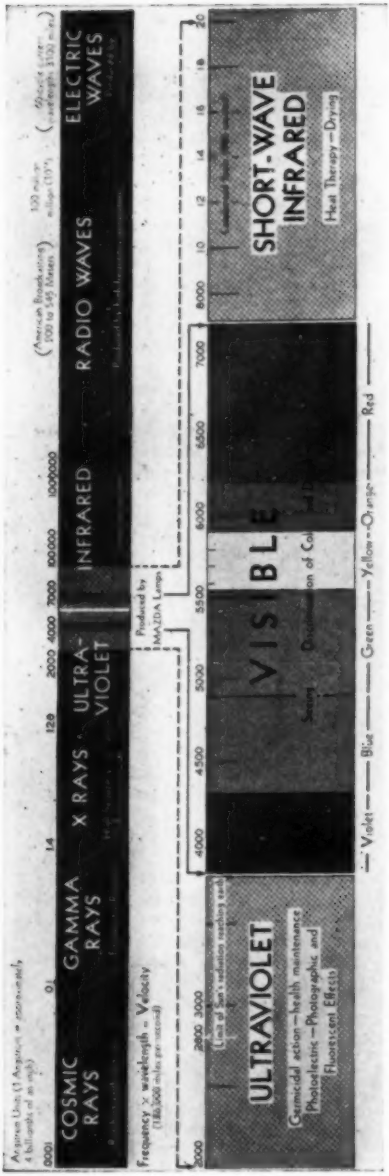
3) Use of heavier-bodied material that produces more coverage per gallon.

4) Replacing oil and spirit stains, wherever possible, with water stains.

5) Employing less wasteful methods and practices whenever and wherever possible.

6) Arrange for cleaning and returning all 5-gallon buckets.

There are probably many other ways that the manufacturer and user can aid each other. The important thing is to begin at once so that shortages, difficulties and uncertainties will be eliminated where it is possible to do so.



★ Infra-Red

BY PAUL O. BLACKMORE

Chief Chemist

THE WORD "infra-red" is a relatively new addition to the vocabulary of the industrial finisher. It first came to his attention as a "new-fangled" method of baking enamels, using time-temperature cycles that had hitherto been considered fantastic. Infra-red baking, bolstered by the fast-curing urea-formaldehyde enamels that made their advent at about the same time, has gone far, and literally volumes have been written about this new tool of industry.

More recently, a new application of infra-red has made its debut. Whereas in paints for infra-red baking, high *absorption* of the infra-red energy was desirable, we are now called upon to make paints for camouflage purposes where high *reflection* is the order of the day, and it is this latter type of infra-red finish that I have chosen for my subject.

In any discussion as to what constitutes "infra-red" reflectance, it will be helpful briefly to consider the theory of color, and the importance to us, as human beings, of the energy radiated from the sun.

Scientists picture the sun as a huge power plant dissipating en-

Fig. 1 — The electromagnetic spectrum showing the wave-lengths and derivation of some of the commonly known energy radiations. Courtesy General Electric Co.

Reflectance of Paints

A clear practical explanation of the theory of color as we see it on everything around us, and how this enables us to discover what is wrong with some camouflage painting which is so easily exposed by aerial photographs made with infra-red sensitive film and a suitable light filter on the camera. Problems that arise in the development and use of infra-red camouflage paints and the instruments we can use to measure and test results produced by these new materials which have become so tremendously important in our camouflage painting.

ergy at an unimaginable rate. This energy is propagated to the earth and to other units of the solar system in the form of electromagnetic waves, which vary only in the distance between their crests. This distance is known as the "wave length" and is measured in "Angstrom units" or "millimicrons." A millimicron is equivalent to ten angstrom units. An angstrom unit is 10^{-8} centimeters, or about four billionths of an inch.

The shortest wave-lengths reaching the earth are about 280 millimicrons in length (see Fig. 1). From 280 to 400 millimicrons we have the health-giving ultraviolet rays which produce our sun-tan. These rays are also capable of causing substances to "fluoresce" or glow in the dark. They are unseen by the human eye, but manifest themselves in painful burns, if we absorb them in excessive amounts.

Our Visible Spectrum

The region from 400 to 700 millimicrons is the so-called "visible spectrum" and is the band with which we, as laymen, are most concerned because it supplies the light by which we ply our daily tasks and the color which keeps our world from being very drab.

Just beyond 700 millimicrons we enter the "near infra-red" region, which is the band we shall presently discuss, and beyond this, there are more infra-red rays of greater length which are the heat rays that cure baking enamels and make one uncomfortable on a hot summer day.

Let us go back for a few moments to the "visible spectrum" for a glance at the theory of color. The energy radiations from the sun, which we can see and which we call "light," are in reality a blended composite of all wave lengths from 400 to 700 millimicrons. Like all other electromagnetic radiations, light waves travel at the enormous speed of 186,000 miles per second in a vacuum; however, when they travel in a transparent medium such as air, water, glass, etc., they travel more slowly.

The ratio of the speed of light in a vacuum to its speed in any given material is known as the "index of

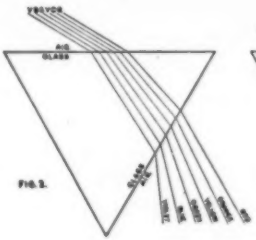


Fig. 2.

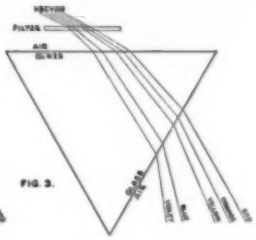


Fig. 3.

Fig. 2—A prism separates a beam of white light into a spectrum. Fig. 3—Selected wave lengths can be removed by certain filters.

refraction" of that material. When light passes obliquely from one medium into a medium of different refractive index, the change in velocity gives rise to a change in direction. The change in velocity is not the same for all wave lengths, therefore the refractive index of a substance depends upon the wave length to some extent, and is generally higher for violet light than for red. Thus, when a beam of white light enters a glass prism, the violet component is deviated the most, the red is deviated the least, and the other wave lengths to intermediate degrees, so that upon emerging from the prism, the light has been separated into the familiar red, orange, yellow, green, blue, and violet of the spectrum (see Fig. 2.)

Why Objects Appear Black, White, Green, Red, Etc.

If we now insert in the path of the incident beam a substance capable of absorbing or "filtering," the wave lengths in the green region, we remove the green component from the beam, and because no green light is entering the prism, we have a blank space in our spectrum (see Fig. 3.) If we continue to insert filters that remove other wave lengths, we eventually cause a complete blackout of our spectrum.

However, not all substances are transparent to light, so let us consider what happens when our beam falls upon an opaque object. Let us take, for example, that telephone instrument on the desk. It is being illuminated, along with other objects on the desk, by the rays of the sun beaming through the window. The telephone instrument is absorbing approximately 96% of all the light that is impinging upon it, regardless of wave length, and converting that light into heat energy. If you care to touch it, you will probably observe that it is the warmest object on the desk. The remaining 4% of the light is being reflected. By contrast with the objects about it, which are reflecting considerably more than 4%, the telephone set looks very dark, and we say it is black.

The paper upon which INDUSTRIAL FINISHING Magazine is printed reflects approximately 90% of the light is receives, regardless of wave length, and because we are seeing reflected light in about the same proportions as it reaches us from the sun, we say the paper is white.

That blotter pad on the desk, however, is a different story. It has the ability to absorb much of the light it receives, except that part of the light at approximately 520 to 540 millimicrons; this it

reflects. Since this is the green region of the spectrum, the reflected light is green, and so we see a green blotter pad. If it also is capable of reflecting some of the light at 500 millimicrons, some blue is also reaching the eye, and we call it blue-green. If, instead of at 500, it reflects at 575, we are seeing some yellow light and it becomes a yellow-green.

The fire plug outside the window is reflecting at approximately 620 to 700 in the red region, and absorbing practically everything else.

Thus we see that our colorful world is dependent upon the ability of the objects about us to reflect certain wave lengths of light and absorb others.

Another glance at Fig. 1 will emphasize the fact that we, as human beings, are doing business in an extremely narrow region of the sun's energy emanations. When we stop to ponder the manifold wonders and beauty that are revealed to us within the limited range of our vision, we rightfully begin to wonder if we are not missing a good deal of what goes on because of those limitations.

Instruments Measure What We Can't See

Our curiosity is satisfied to a certain extent by virtue of the fact that we possess instruments which are capable of making measurements and recording events in the wave lengths outside our range of vision. One of these instruments is known as the Hardy Recording Spectrophotometer. This amazing instrument causes a beam of white light to impinge upon a given surface. As explained above, for variously colored surfaces, certain wave lengths of this light are absorbed while other wave lengths are reflected. The instrument picks up the reflected beam, separates it into a spectrum, analyzes the spectrum, wave length by wave length, and automatically draws a curve which represents the percentage of each wave length of light reflected from the surface in question, as compared to the percentage of that same wave length reflected from a block of pure magnesium oxide, which is the whitest, most highly reflecting substance known.

We thus obtain a graphic picture of the color in question. We also have a permanent record of it. It would be possible for one versed in the art to make an exact duplication of the color without ever having seen the original, simply by matching the spectrophotometric curve. Figures 4, 5, 6 and 7 represent four such graphic pictures of the black telephone set, the white paper, the green blotter pad, and the red fire plug.

A Hardy recording Spectrophotometer.

Fortunately for our curiosity, the Hardy spectrophotometer has twice the range of vision that human beings have. Whereas we can see wave lengths from 400 to 700 millimicrons, the spectrophotometer can see from 400 to 1,000 millimicrons, or beyond, depending upon the sensitivity of the photoelectric cells that are used. With it, we

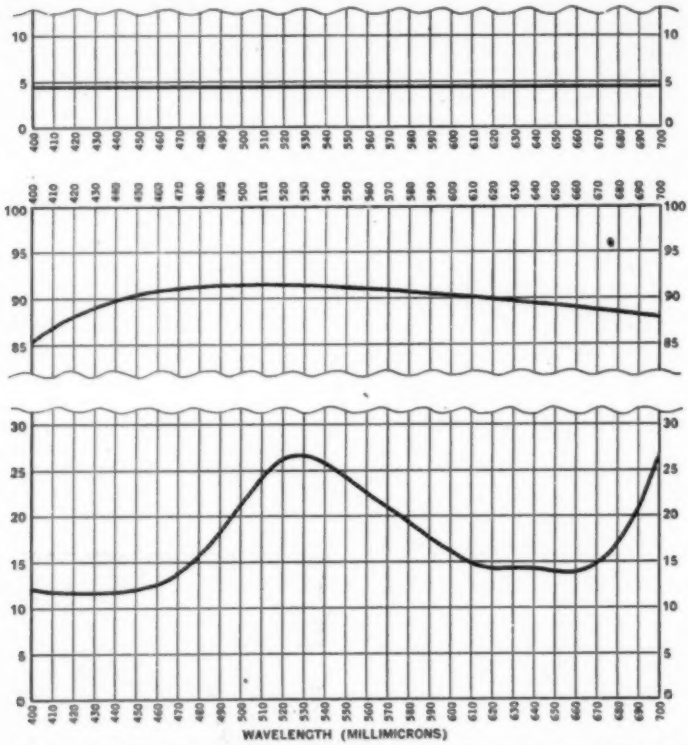


Fig. 4—A carbon black enameled surface, such as that on your telephone instrument, reflects only 4½% of the light, and all wave lengths equally, therefore the spectrophotometer curve is a straight line.

Fig. 5—Spectrophotometer curve of white paper with titanium filler.

Fig. 6—Spectrophotometer curve of a green blotter pad (as on an office desk).

can probe into the mysteries of the "near infra-red," which brings us to our discussion of infra-red reflecting camouflage paints.

Matching the Color of Green Maple Leaf

For the purpose of our study, let us consider a single maple leaf, of which millions make a forest as seen from a plane at 5,000-ft. up. Our maple leaf, like our blotter pad, is green, which means it is reflecting light at approximately 550 millimicrons, as shown by its curve in Fig. 8. That it is not as bright a green as our blotter pad is evidenced by a much lower peak at that wave length.

To produce our camouflage paint, we must match this curve. We do this without too much difficulty,

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EGYPTIAN Superior Finishes will help you in producing war jobs with a maximum of protection and a minimum of difficulties. Speed and ease of application plus a durable finish will enable you to turn out your product faster and better.

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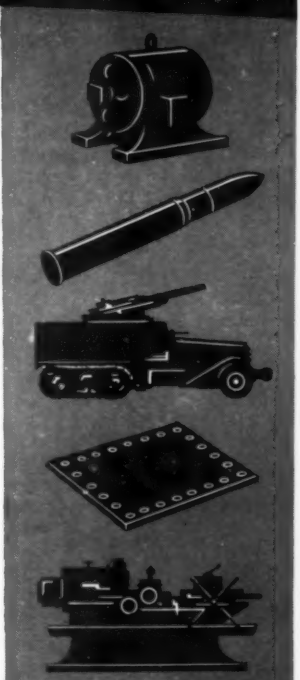
Write us your specific requirements. It may be that we can help prevent costly delays, bottlenecks and rejects in your finishing department . . . Or we may enable you to cut some corners that will speed production and at the same time improve your finished product . . . And there's no better way to build or sustain a reputation for post-war business than to produce the best for the war effort.



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charges, airplane floats, marine engines, scout cars, bombers, patrol boats and battleships—are being speeded into war service with the help of DeVilbiss Spray Equipment.

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and feel very happy about the whole thing. Then along comes a fellow with a camera containing infra-red sensitive film and a filter that cuts out all of the visible light. He takes a picture of our camouflage. When he shows the result, our glow of self-esteem becomes just a memory. To our dismay, our camouflage area stands out on the photographic print as black as your hat, whereas the maple leaf shows up a light gray or white. (Fig. 9.) If he had used panchromatic film and no filter, we would still be glowing with satisfaction, because, under those conditions, the camera would have seen our color match just as our eyes saw it (see Fig. 10).

Spectrophotometer Reveals Our Camouflage Failure

What has happened? For the answer, we must turn to the spectrophotometer. If we now permit

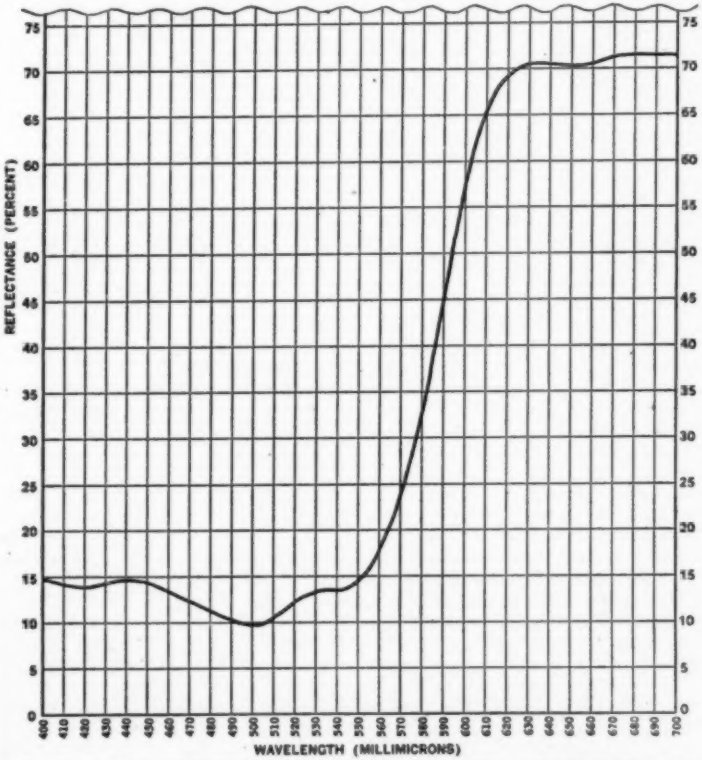

Fig. 7—Toluidine red enamels, such as are used on fire-plugs, reflect more than 75% of the red wave lengths from 620 to 700, but reflect only 10% in the green at 500.

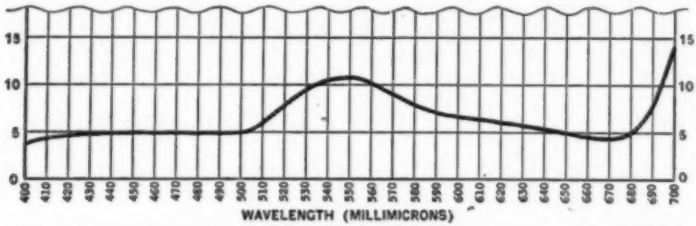

Fig. 8—Spectrophotometric curve of a maple leaf, showing maximum reflection in the green at 550. Note the beginning of a second rise at 680.

the machine to record what goes on from 700 millimicrons on out, it reveals the fact that our maple leaf is capable of reflecting infra-red light to an even greater extent than it does the visible, and what is more, it reflects practically all wave lengths longer than 720 (see Fig. 11). The spectrophotometer also tells us what befell our camouflage paint, for it points out that our pigment combination is not capable of producing anything like the degree of reflectance of our maple leaf (Fig. 12).

In Fig. 13 we see a curve *A*, representing the sensitivity of the film-filter combination used in the camera. Its point of highest sensitivity is at approximately 805 millimicrons. At 790 and 820, or thereabouts, the sensitivity is only 50% of that at 805. It tapers off rapidly in both directions, and does not respond at all to wave lengths below 730 or above 860 millimicrons. In the same illustration, curve *B* represents the spectral reflectance of the maple leaf as shown in Fig. 11. If we multiply the values of curve *A* by the values of curve *B* wave length for wave length, the product, curve *C*, or rather the shaded area underneath it, may be taken as a measure of the amount of light that is available to blacken the negative during any given exposure interval. The darker the negative, the whiter the print, which explains why our maple leaf appears light gray or white on the print.

If we follow the same procedure, and substitute the spectral reflectance curve of our camouflage paint for that of the maple leaf, we obtain a curve, the shaded area of which represents the amount of light available from the paint. (Fig. 14.) It will be seen that it is very much less than in Fig. 13; hence, our negative is blackened only slightly and the print appears dark.

Infra-Red Reflecting Greens

It will be giving away no secrets to state that chromium oxide is an excellent pigment for producing infra-red reflecting greens. Applying its spectral reflectance curve in the manner described above, the reason becomes quite apparent (Fig. 15).

From the preceding discussion, the value of infra-red reflecting camouflage paints becomes equally apparent. Obviously, an area camouflaged with a green paint that does not reflect infra-red light to about the same extent as the surrounding foliage, will stand out in bold relief. By the same token, a paint whose infra-red reflectance is substantially higher than that of the surrounding terrain would

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This Mahon Hydro-Filter Spray Booth operates on the down-draft principle of fresh air supply. When in use it is enclosed by heavy, fire-resistant canvas curtains, suspended from a folding metal framework. Over-spray is drawn through the grill in floor and exhausted outside the building by means of the Mahon Hydro-Filter process. When not in operation, curtains and framework are folded back and space is available for other purposes.

A Typical Example of How MAHON Finishing EQUIPMENT is engineered FOR UNUSUAL PLANT CONDITIONS

This company had a perplexing problem. They urgently needed a spray booth capable of handling an exceptionally large product. But, already overcrowded with war work, no space could be spared for its erection.

Mahon engineers were called in and surveyed the situtation. They selected a location convenient to the Drying Ovens (also Mahon-installed) and designed and installed a Mahon Hydro-Filter, Down-Draft Spray Booth that efficiently functions whenever painting of the product is required—but that can be folded back out of the way when the space is needed for other purposes. Just another instance of Mahon co-operation—a typical example of how Mahon equipment can be designed and adapted to meet plant, product and operating conditions.

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be just as conspicuous by virtue of its contrast on the white side. Therefore, most government specifications covering infra-red reflectance peg the values within rather narrow limits, generally ranging from 35% to 55%, which nicely takes in our maple leaf (see Fig. 11).

The texture of the painted surface is also very important to the success or failure of the effort, but that comes under the art of camouflage itself, and is outside the scope of this discussion.

It all sounds very simple, but if you are a user of infra-red reflecting paints, do not start being complacent, because we have not yet let you in on the whole story. There are plenty of problems ahead both for you as a user and for us as paint manufacturers.

Paint Formulator's Problems

The first problem of the paint manufacturer was to determine which of the pigments were high in infra-red reflectance and which were not. This was easy, because the spectrophotometer is capable of turning out a curve every two or three minutes. It was discovered, however, that when these pigments were used in making up paints, the infra-red reflectance of the paints were not in line with the values determined for the pigments. This was found to be caused by two things:

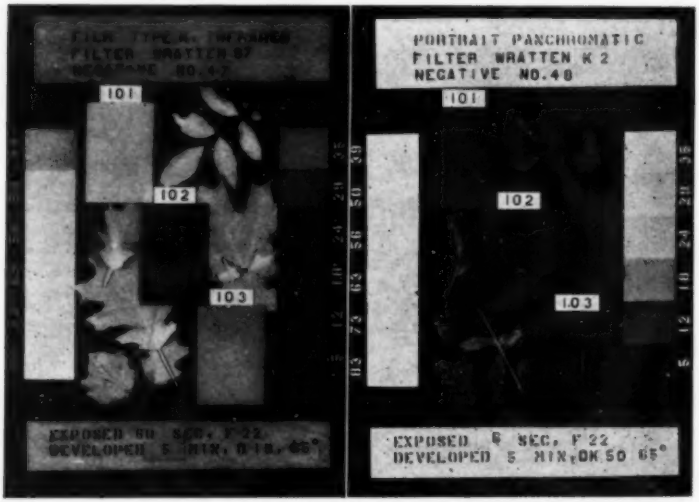

Fig. 9—An infra-red photograph of three painted panels against a background of green foliage. All three panels are olive drab and are exactly the same shade, but panel No. 102 is not made with infra-red reflecting pigments. Note that the foliage is somewhat brighter than the area on gray scale designated as No. 39.

Fig. 10—The same three panels and foliage taken with panchromatic film and a Wratten K2 filter. Here, the camera, like our eyes, does not pick out the difference between the different camouflage painted panels and the green foliage. With only this evidence we would be deceived and perhaps draw wrong conclusions.

WHERE these fighting forts are headed the going will be tough. But they're well prepared for the job . . even to the "war paint" they wear. Many of Uncle Sam's tanks are covered with Johnson's Olive Drab Enamel, a tough, protective paint especially made for the job. Shell casings and bombs too are lacquered with a special Johnson finish. And Johnson's Wax-O-Namel forms a protective coat for millions of gas mask parts.

Yes, Johnson's paints have gone to war, and the uses mentioned point to this fact: Our Product Finishes Division is well equipped to supply a great variety of paints and finishes to war material contractors. We can promise SPEED in developing special finishes for particular jobs. Can we help you? Write Dept. IF-92.

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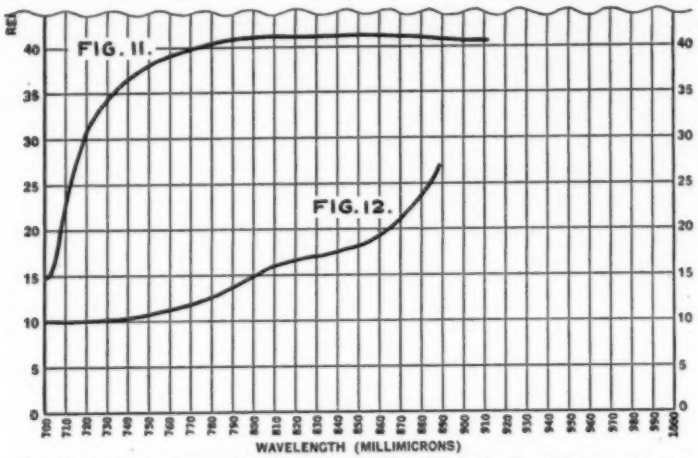


Fig. 11—A curve of the maple leaf extended into the infra-red. Note that the rise, which began in Fig. 6 at 680, continues in the infra-red, reaching a peak of about 41%. The green leaf reflects more light in the infra-red than in the visible.

Fig. 12—Curve in the infra-red of the camouflage paint represented in Fig. 9 by panel No. 102. It reflects nothing like as much infra-red light as the maple leaf.

1) Most pigments are more transparent to infra-red rays than they are to the visible rays. Therefore, unless pigmentation is high enough to produce complete opacity to the infra-red rays, part of the total reflection may be due to the characteristics of the surface upon which the paint is applied.

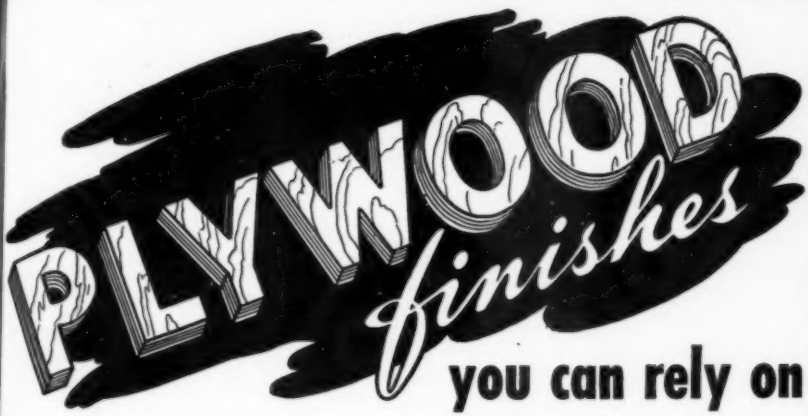
2) The refractive index plays an important part in the opacity of the pigment, and therefore in its infra-red reflectance.

Both of these points will bear further discussion because they affect the user as well as the manufacturer. In order to understand point No. 1 more clearly, let us create an analogy in the visible region.

Hiding Power of Paint

Almost everyone has seen or used the familiar black and white hiding power charts. To determine opacity or hiding power, the paint and brush are placed in a container and weighed. The paint is then brushed on the hiding power chart in an amount just sufficient to completely obliterate the black and white squares or lines. The container, brush and paint are reweighed and from the loss in weight and the known area of the chart, the coverage in square feet per gallon can be computed.

In another method, a given amount of paint is applied to the chart as evenly as possible. The amount is chosen so that complete obliteration of the chart does not result. With a suitable instrument, the reflectance of the paint over both black and white is measured, and the "contrast ratio" is determined by dividing the reflectance over white by that over black. Since the reflectance over white will be higher, the contrast ratio



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This product has an outstanding record of service on plywood air-conditioning units, cabinets, and other equipment which must withstand severe atmospheric conditions in all parts of the world. And it's suited to *fast production schedules.* Handles easily and dries quickly. Penetrates deeply—practically becomes part of the wood, "breathing" with it and keeping it permanently plastic and alive . . . SEALER No. 30 is the ideal protective coating for industrial products and *aircraft* made of plywood.

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We believe no finish will ever equal shellac. But shellac has been drafted for service by Uncle Sam. It is fighting with our navy, flying with our air corps, battering against the enemy with our army. The Government is holding a large stock pile in reserve for only the most necessary and vital military purposes.

Meanwhile, for all other military requirements and essential civilian needs here at home, life goes on—and wood finishers, furniture manufacturers, painters, and floor finishers, need a finish they can depend on for the duration. That finish is ZINLAC. It is the *best substitute for shellac* that science, skill, and 94 years of experience with shellac can create. No other shellac-substitute on the market can equal it in economy, in efficiency, in the ease with which it can be used!

WHAT ZINLAC IS

ZINLAC is the result of years of research by chemists and laboratories working for William Zinsser & Co.,—who anticipated the possibility of a shortage of shellac and prepared for it carefully, painstakingly, scientifically. It is *not* a make-shift, hastily put out to meet a sudden demand. It has been created under the most rigid controls and standards.

ZINLAC will proudly bear the famous Bulls-Eye trade mark—symbol of the finest finishing products for 94 years! Although ZINLAC is different from Shellac in appearance, it is amazingly like shellac, and when applied it looks and acts just like Shellac. It is a straight alcohol finish and can be used and treated just as you would use Shellac. ZINLAC should not be confused with quick drying oil, benzine or other preparations with disagreeable odors, with which the market has been flooded for years, and which are now being offered as "Substitutes."

ZINLAC is a finish you can use with confidence to substitute for shellac on practically every kind of job.

ZINLAC

ZINLAC HAS MOST OF THE PROPERTIES OF SHELLAC

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QUICK DRYING . ZINLAC will dry fast to the point where it can be sanded without gumming.

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ZINLAC is not shellac, and *contains no shellac*. Neither is it based on the old alcohol soluble natural resin combinations. But it's the next best thing to shellac for war-time use.
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1. Use like shellac in applying, either by brushing or by spraying.
2. To thin, use ONLY proprietary solvents such as Shellacol, Solox, Paco and Ponsolve.
3. Do not use any other solvents than those mentioned.
4. Do not mix with lacquer, varnish or paint.
5. Do not store in sunlight or near radiators. Keep in a cool place, like shellac.
6. Keep in glass or wood. Avoid long contact with metal.
7. To secure best results ZINLAC, like shellac, should be used within a reasonable time.

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will be greater than one. However, the higher the opacity, the closer to one the ratio will be.

As an extreme case, suppose we try to make a paint out of silica, which is one of the most transparent inert pigments. Having done so, we apply it in copious quantities to the hiding power chart, and make practically no headway in obliterating the black and white areas. In this case the contrast ratio is just about that of the black and white themselves. If we now add titanium dioxide to our paint in increasing amounts, the black and white areas become increasingly less visible until they are finally obliterated and our contrast ratio has become equal to one. If we cover our hiding power chart with a black paint, we experience no difficulty at all. Intermediate colors require intermediate amounts.

We have done this so often that we have learned to expect certain shades, notably white, ivory, buff, some yellows, and maroons to have poor hiding, while we expect others to cover extremely well.

Exactly the same thing takes place in the infra-red, but to a much greater degree. A certain pigment combination may be used in sufficient quantity to provide adequate hiding in the visible and still be highly transparent in the infra-red.

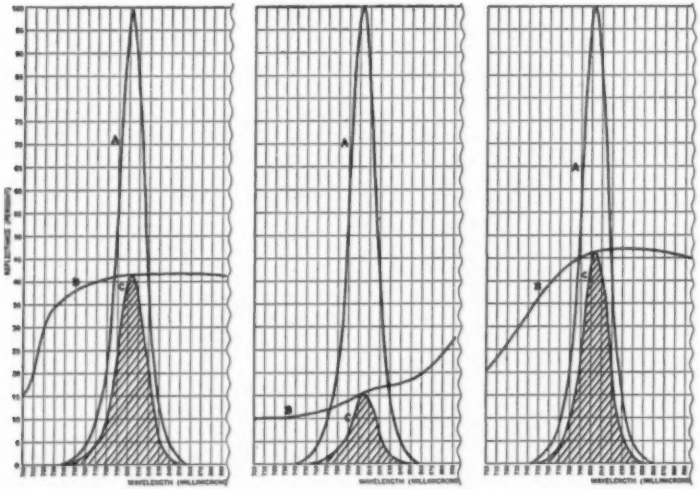

Fig. 13—Curve A: Average sensitivity curve for combination of Wratten No. 87 filter and Eastman infra-red film. Curve B: Infra-red reflectance of maple leaf, as in Fig. 11. Curve C: Product of A and B, which represents degree of exposure or blackening of negative.

Fig. 14—Curve A: (See corresponding caption for Fig. 13). Curve B: Infra-red reflectance of camouflage paint shown in Fig. 9, panel No. 102. Curve C: (See corresponding caption for Fig. 13).

Fig. 15—Curves A, B and C, where B in this case is chromium oxide, a green pigment that has about the same infra-red reflectance as green foliage. It photographs gray on the positive. See Fig. 9, panels 101 and 103.

Before Pearl Harbor..

ARCO HAD ALREADY SOLVED THE PROBLEM OF

Infra-Red Reflectance

Long before our entry into the war, the Research Laboratories of The Arco Company, anticipating today's vital need, had perfected ARCO INFRAY*— the original infra-red reflecting camouflage paint. Meeting federal specifications, INFRAY is enjoying ever increasing use throughout America's war industry. Detailed information on INFRAY'S many war-time functions has been compiled and is available on request.

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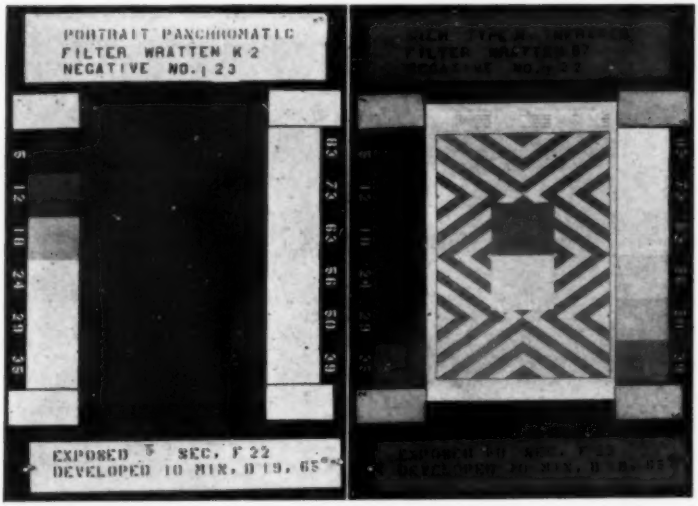

Fig. 16—Panchromatic and infra-red photographs of a black and white hiding power chart. The panchromatic picture shows complete visual hiding, whereas the infra-red shows transparency to a very high degree.

Fig. 16 shows two pictures taken of one of the previously discussed hiding power charts coated with a film of an infra-red reflecting lacquer. Note that whereas the panchromatic film shows complete visual hiding, the infra-red film clearly shows the black and white areas underneath.

Government Specifications on Infra-Red Reflectance

Most of the existing government specifications covering infra-red paints recognize this transparency and contain a contrast ratio clause to insure adequate infra-red hiding. For example, the Ordnance Department uses large quantities of an infra-red reflecting olive drab enamel which they buy under Ordnance Department Specification AXS 684 Revision 1. This specification calls for an infra-red reflectance of not less than 37% over black and not more than 45% over white. This is a contrast ratio of 1.216. The specification allows one mil dry film thickness to achieve that contrast ratio.

The paint manufacturer can keep his contrast ratio low in two ways. He can match the color with pigments that have relatively high infra-red opacity, such as chromium oxide, or he can use a greater quantity of colors that are more transparent. In either case, as the contrast ratio goes down, the cost goes up. Of one thing you can be very sure: If you are taking advantage of the highly competitive market and buying your paint on price, plus the assurance of the manufacturer that his product meets the specification, you may gamble that the contrast ratio is no lower than the law allows.

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The transition from peacetime to wartime found Lowe Brothers ready with Government Specification Finishes which are helping to keep a wide variety of America's war weapons and materials always combat-ready despite their continuous exposure to weather, temperature and transport hardships.

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When **YOU** *need information regarding U. S. Government Specification Finishes . . . such as application data, thinning ratios, drying schedules, bids or costs—you can count on Lowe Brothers to supply it in a hurry.*

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What happens to you? Nothing, if you maintain your film thickness at one mil in production; however, if you are using black iron and your finisher fails to spray on enough paint, or if he thins the material in the dip tank too far in the interests of better flow, or greater economy, the infra-red reflectance of your product may well drop to 25% or less at ½-mil, and your production is rejected. Conversely, if your metal is bright and shiny, low film thickness may result in the reflectance exceeding 45% with rejection again the penalty. A film that is too heavy may also result in a high reading.

If you have had difficulty maintaining your reflectance within the limits set by the specification, it may pay you to ask your supplier to provide a paint with a lower contrast ratio, even though it be at a higher gallon cost. *Rejections eat up paint savings very rapidly.*

Refractive Index and Reflectance of Pigments

Earlier in the discussion, we mentioned "refractive index" as a factor affecting infra-red reflectance. It has long been known that the opacity of any pigment-binder combination was a function of the *difference* between the refractive indices of the pigment and binder respectively. For example, pigment that we consider inert or transparent in an oil or resin binder, may exhibit relatively good hiding when used in a water paint, because we have increased the spread of the refractive index values.

The same rule holds good in the infra-red. For example, ultramarine blue, in the dry state, has a reflectance of approximately 45%. When wet with a binder, it drops to less than 20%. Thus, in order to do an intelligent job of formulating, the paint manufacturer must know what part refractive index plays in the reflectance of his pigments.

Another common source of trouble lies in shading. Any foreman finisher knows that if he adds a touch of red to a clean bright green, the color goes muddy out of all proportion to the amount of red added. He also knows that a nice clean white may be ruined by a carelessly cleaned pressure tank or fluid hose. Very minute amounts of the wrong toner will neutralize or kill a color, and very often it can never be brought back to life.

Some of the "Poisons" to Infra-Red Paints

Infra-red also has its "poisons." Black is one of them. If you have some black lying around from the good old days, when you made gadgets for thing-a ma-bobs, we earnestly recommend that you hide it, or otherwise remove the possibility of its being used as a toner in case you receive a shipment "on the light side."

Iron blues (Prussian, Chinese, Milori) are also poisons. So are chrome greens. Oxide reds and yellows are not good, although they may be used in the lower brackets of reflectance.

Visual Gloss May Mislead or Confuse You

Remembering that existing prices will not permit bonuses in infra-red reflectance values, the faintest touch of any of the "poisons" mentioned above may prove fatal.

It behooves one, therefore, to be meticulous in the care of equipment in order to avoid contamination. It is also wise not to attempt any shading. That should be left strictly up to your supplier.

Do not make the mistake of confusing infra-red reflectance with

Both the ARMY *and* NAVY *demand* GOOD PAINT ADHESION!

.. AND THEY WILL REJECT POOR PAINT JOBS!

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IN ORDER to pass Government inspection, effective cleaning and proper paint adhesion are absolutely essential. Don't take chances with inadequate cleaners or cleaning methods that invite paint failure. Use Prep Products, the proven line of cleaning and metal treating materials that provide the proper foundation for paint and assure an enduring finish.

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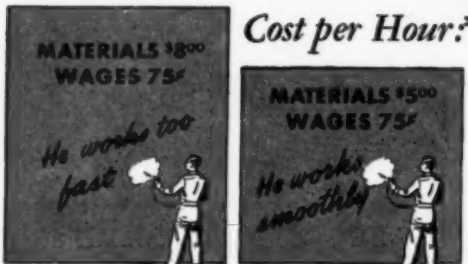
1. UNIFORM COATINGS SAVE MEN AND

▶ It is wasteful to apply a coating *too heavy* in one spot, *too thin* in another. Manpower is wasted when the work must be gone over again. Time is wasted when the job is rejected. W war are wasted. But sy tic with improved, more ient s niques will speed the effo



2. IT DEPENDS ON THE HUMAN FACTOR

▶ It is false economy for men to rush their work or be rushed by others, as lower efficiency, increased "rejects," and waste of materials result.

(Material costs based on synthetic paint at $2.25 to $2.50 per gallon, with gun operating 1 hour. Hourly rate given merely as example.)

STREAKING (*Loss of co power due to irre coating.*)

3. WHAT APP FILM IS T U

▶ These are only e of th sults when the spr g is ru is not uniform. S atize and you can help d up t

ne ishing...*from the Du Pont Man* •

AND TERIALS

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But sys nic procedure
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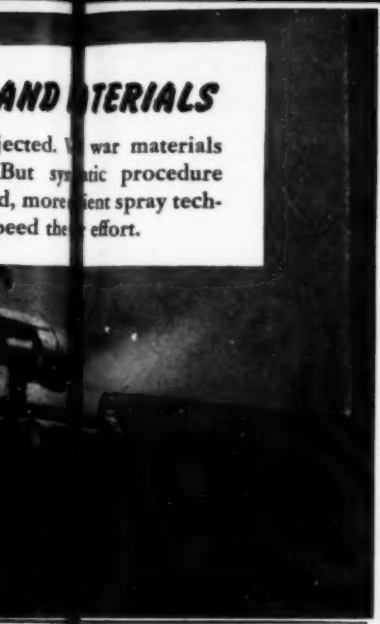
peed the effort.



Loss of ca to irre

SAGS AND RUNS (*Result from too much material sprayed in one spot.*)

VHAT APPENS WHEN M ISN'T UNIFORM?

re only e of the more common re-
the spr is rushed and the coating
orm. S atize spraying procedures
n help up the war effort!

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visual gloss. While it is not correct to say that the reflectance is not affected by gloss, we can say that the effect is slight, and it may be in a direction opposite to what you might suppose. For example, a panel coated with a non-specular infra-red reflecting enamel, and then recoated over one-half the panel with a clear gloss varnish, showed a difference of only 1% in infra-red reflectance, and *the flat area was the higher of the two.* We remind you that the human eye is not sensitive in the infra-red region; therefore, one cannot draw any conclusions based on visual observations.

By this time you are supposed to be properly impressed and frightened to the point where you ask, "How can I know that the paint I am buying meets the specification and that my production is running as it should?"

Substitute for Spectrophotometer; Photographic Outfit

We cannot all have spectrophotometers, and not many of us can have reflectometers; however, if there is an amateur photographer in your organization, your problem is practically solved. He already has a camera. Provide him with some infra-red film, a suitable Wratten filter as called for in the specification, a uniform light source, and some Munsell standard grays, and he is ready to make infra-red measurements.

Fig. 17—Photograph showing an arrangement of camera, stage and illumination that has proven highly satisfactory for quantitative photography.

The camera can be any good commercial grade capable of utilizing infra-red cut film. For best results, it should have a focal length of not less than 6-in. It is generally considered that results are not accurate outside of a circle on the negative whose diameter is one-third the focal length of the lens. Thus, a 6-in. focal length permits a 2-in. circle. A lesser area than this is too small to be practical. The camera is placed so that the lens is about 6-ft. above the photographic stage on which the objects to be measured are placed. This distance will include within the prescribed 2-in. circle on the negative, an area on the stage of about 17-in. on a side, which is large enough for most purposes.

The Wratten 87 filter is specified in the Ordnance Specifications. Most others for camouflage purposes call for a Wratten 89-A. Any photographer is familiar with their use.

The light source is very important. Great care must be taken to insure absolutely uniform illumination of the photographic stage. The type of illumination shown in Fig. 17 has given highly satisfactory results. It will be seen that it consists of twin lamp-banks with flat surface type reflectors. Each bank is a straight line source, the advantage of such a source being that the illumination is uniform along any line lying in the photographic stage plane and parrallel to the line source. The twin banks on

Munsell Notation	700 mm	743 mm	775 mm	805 mm	850 mm
N 2.5	5.2	5.2	5.2	5.2	5.2
N 4.0	12.0	12.0	11.9	11.9	11.9
N 5.0	18.5	18.4	18.3	18.2	18.1
N 5.5	24.1	24.0	23.9	23.7	23.6
N 6.0	29.0	28.8	28.6	28.4	28.2
N 6.5	35.5	35.2	35.1	34.9	34.7
N 7.0	41.9	41.4	41.0	40.6	40.1
N 7.5	50.4	50.4	50.4	50.4	50.4
N 8.0	56.2	55.9	55.7	55.4	55.1
N 8.5	63.8	63.5	63.3	63.0	62.8
N 9.0	73.1	73.1	72.9	72.8	72.7
N 9.4	84.2	83.9	83.7	83.3	83.0

Fig. 18—Percent reflectance.

opposite sides of the stage produce uniform illumination over the whole stage.

Each bank consists of six 200-watt Mazda lamps spaced at a distance of 9-in. The angle of incidence from the source to the center of the stage is 45°. This angle of incidence is chosen to reduce to a negligible amount the effect of gloss in masking the diffuse reflectance of the light from surfaces that are not entirely non-specular. Even low gloss surfaces show some halation or haze at near-mirror angles of reflection, which is eliminated by the 45° angle of incidence. The stage itself is 34 x 48-in.

Measure With Standard Munsell Color Co. Grays

The yardstick to be used for measuring the actual reflectance consists of a series of standard grays manufactured by the Munsell Color Co., 10 E. Franklin St., Baltimore, Md. These grays are obtainable in convenient steps from very low to very high values of reflectance. Fig. 18 shows a chart giving the Munsell designation and the values of the various grays, as measured by the spectrophotometer at wave lengths corresponding to 700, 743, 775, 805, and 850 millimicrons.

The standard grays are coated on heavy paper sheets. The sheets should be cut to a convenient size and mounted on a rigid base. The surface of the sheet should never be touched. Grease marks or dirt will change its reflectance value.

If your interest is merely in knowing whether or not your paint or production is within the limits set up by the specification, you will not need quantitative values. It will be necessary only to select the Munsell grays corresponding to the maximum and minimum values called for in the specification, and each time a picture is taken, place the maximum and minimum standards on opposite sides of the object in question, but as close to it as possible. Upon examination of the negative, if the grayness of the object falls between that of the maximum and minimum standards, you are within the specified limits. If it does not, check your dry film thickness with a micrometer, taking readings at several points and averaging them.

Consider Film Thickness to Achieve Reflectance

The specification allows your supplier a certain minimum film thickness to achieve the required reflectance. If your production is running less than minimum, you do not have a legitimate complaint. If, for some reason, you do not find it practical to apply the allowable film thickness, then you should

Now we're ready with the answers
to your conversion problems

Here is Answer No. 4

Now that the Government has placed restrictions on the use of certain critical raw materials in the manufacture of coatings, finishers, for the first time in their history, are faced with the necessity of finding satisfactory substitutes. In some few cases, simple revision of old formulas will be sufficient, but in most cases the problems involved call for a completely new formula using non-restricted materials.

The important thing is to get in touch with our laboratory experts at once, before your present supply of coating material is exhausted. Don't risk experimenting with makeshift substitutes or unknown materials. Be sure you have a formula that exactly fits your conditions before you are forced to make the switch. Let our laboratory experts start to work on your problem *now*. In all probability they will write you a prescription that will be far more satisfactory than the old formula you have used for years—a prescription "tailor-made" to fit your own shop conditions and making use of materials on which there are no Government limitations.

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ask your supplier to provide a paint with a lower contrast ratio, so that by virtue of its greater infra-red opacity, you can attain the specified reflectance at a lesser film thickness. As stated above, this will entail some additional cost.

If the film thickness proves to be as specified, the next step is to check the paint for contamination by tapping a new container. If the reflectance still fails to respond, call the supplier. There is nothing you can do to help yourself out of the trouble if the paint is actually at fault. It must be made right by someone who is versed in the art of formulating infra-red finishes.

There are intermediate Munsell grays not shown on the chart in Fig. 18. If you require values other than those shown, it is suggested that you ask the Munsell Color Co. to supply them.

If it is desired to obtain quantitative results, so that they can actually be expressed in percent reflectance, it is perfectly possible to obtain them by the photographic method with amazing accuracy. However, quantitative photography is somewhat more complicated and requires careful manipulation.

Here, a complete scale of Munsell grays is required such as the set shown in Fig. 9. This gray scale was prepared by fastening, with rubber cement, a rectangular area 2½ x 3-in. of each Munsell sheet to a strip of 18-gauge furniture steel which had been previously coated with a flat black paint. The steel strip is 20-in. by 4-in., leaving 2½-in. at either end by which it may be carefully handled to avoid soiling, and a 1-in. strip at the top on which are stenciled in white the reflectance values of the scale. The gray scale should be placed upon the photographic stage, so that its image falls within the area of usefulness on the negative (one-third the focal length of the lens).

The photographic procedure is exactly the same as that described for the qualitative method. We emphasize against the importance of absolutely uniform illumination. It is desirable to check the illumination with a Weston light meter. It is also a good idea to place pieces of a given Munsell gray at various positions on the stage and take pictures to see if the reflectance measures the same at all positions. If it does, you may rest assured that the illumination is satisfactory.

Development of Negatives

Nothing has been mentioned up to now about developing the negative. The specification generally gives the kind of developer to use, as well as the time and temperature recommended. Let us say only that for quantitative photography a developer giving a high contrast is desirable. Eastman D-19 developer, used at 65° F. for ten minutes on Eastman infra-red film, yields satisfactory results. For film other than Eastman, use a developer recommended by the manufacturer to give a high contrast. The developer should be made up very carefully and used the same way. Fresh developer should be made up for each use, and discarded immediately thereafter.

Use a Densitometer

With the negative properly developed, the next step is evaluation. For this step, a "densitometer" is required. A densitometer is an instrument for determining numerically the degree of exposure or blackening of the negative. If your favorite photographic supply house does not have one in stock,

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he will order one for you. They are available in various degrees of accuracy and an instrument sensitive enough for your purpose will not be terribly expensive.

Using the densitometer, a density value is established for each area of the gray scale, and this value is plotted on a piece of graph paper against the logarithm of the known reflectance value for that area. A smooth curve is obtained which represents a calibration curve for that particular negative. Having established the calibration curve, density values are obtained for each unknown on the negative, and the logarithm of the reflectance may be read directly from the curve.

Each negative must be calibrated. *Never attempt to use the calibration curve for one negative in the evaluation of another.* There may be variations in the exposure time, the speed of the film, the strength and temperature of the developer, etc. However, by photographing the calibrated gray scale each time, all of these variables are automatically canceled out and do not affect the accuracy of the final result.

Panel No.	Photographic	Spectrophotometric
1	35	36.0
2	35	37.2
3	44	45.9
4	46	47.0
5	42	44.5
6	44	42.7
7	38	41.0
8	41	42.3
9	40	41.1
10	44	45.2
11	37	39.9
12	40	43.0
13	38	38.6
14	40	41.8

Fig. 19—Comparison of values.

The readings obtained actually represent an integrated reflectance value of the object in a relatively narrow band at about 805 millimicrons.

After a little practice to develop technique, this method can be made to yield amazingly accurate results. The table in Fig. 19 shows a comparison of values obtained by this method with those given by the spectrophotometer.

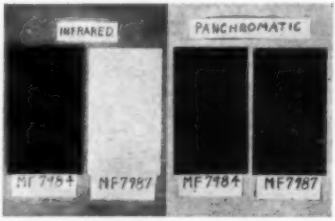

Fig. 20 — Infra-red and panchromatic photographs showing a regular vs. "white" lampblack. Both appear black to the eye and in an ordinary photograph, but when photographed with infra-red camera and filter, one shows white.

It will be conceded that the photographic method is certainly accurate enough for production control, and the relatively low equipment cost further recommends it.

Infra-Red Reflecting Paints Have Other Possibilities, Too

We have seen, from the preceding discussion, why infra-red reflecting paints behave in the manner in which they do, and what part they play in the art of camouflage. With such an interesting new development in their possession, it is quite natural that paint technicians should begin to speculate as to what other uses might be found for their new offspring.

It has been suggested that, since infra-red rays are heat rays, particularly in the longer wave lengths, and since infra-red measurements made out beyond the photographic range indicate no major change in the degree of reflectance of our paints and enamels, we might ex-

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pect them to be of value in applications where heat reflectance is desirable. For example, oil and gasoline storage tanks are painted aluminum because of the ability of aluminum paints to reflect heat rays, as well as for the recognized durability of such finishes. Large amounts of high-test motor fuels are saved yearly by taking advantage of the reduction in evaporation rate provided by their highly reflecting surfaces.

Unfortunately, aluminum painted tanks are visible for great distances, and offer an incentive for enemy airmen to veer off their course. Tanks painted in subdued colors (dark grays or greens) are subject to correspondingly higher evaporation losses. It is reasonable to assume that a tank, painted with subdued gray into

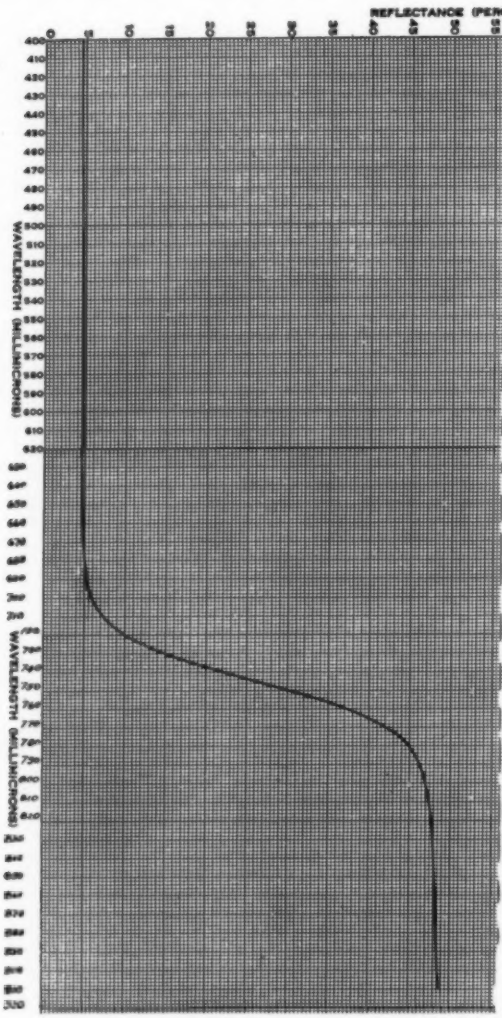
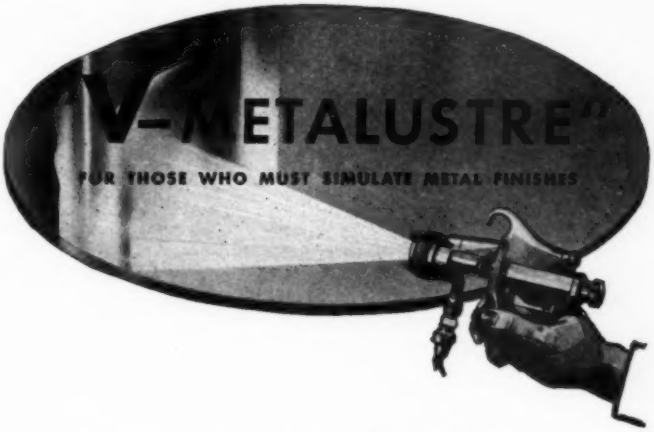


Fig. 21—Spectrophotometer curve of panel marked MF7987 in Fig. 20. The curve for the other panel (MF7984) continues straight along reflectance (per cent) line 5, whereas at higher wave lengths MF7987 curves abruptly and reaches almost 50% reflectance at 910. Both appear black to the eye (400 to 700mm) but MF7987 is practically white when it is photographed with the infra-red camera.



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which infra-red reflecting properties have been incorporated to a point approaching that of aluminum, would have a proportionately smaller evaporation loss. Tests are now being run to determine how justified that assumption may be.

"White Lampblack" No Longer a Joke

It has been a joke of long standing among paint technicians to send a raw laboratory recruit to the stockroom for some "white lampblack." However, the joke has suddenly become obsolete, for without a "white" black it would be impossible to make a gray such as that described above. It was stated earlier in the discussion that blacks were "poison" to infra-red reflecting finishes, but necessity, always the mother of invention, produced a black whose infra-red "toxicity" is conspicuous by its absence.

Such a black is shown in Fig. 20. A glance at the curves in Fig. 21 will show that in the visible region from 400 to 700 millimicrons, it is still just as black as the telephone set on the desk (Fig. 4) but that beyond 700 it rises in the infra-red to 49% and is, therefore, to the camera or any instrument measuring in the infra-red, truly a "white" black.

As mentioned above, a white black is essential for toning our infra-red reflecting grays and olive drabs. It is also useful in blackout paints where its high reflectance keeps window glass cooler—perhaps keeps it from cracking by eliminating much of the absorption of the sun's energy.

Who knows but that after the war our motoring may be made more enjoyable on a hot summer day by virtue of the fact that our shiny new automobile is painted with "white lampblack"? *(End.)*

For testing the application of color to airdrome runways, Eclipse Air Brush Co., Newark, N. J., made up special spray equipment for use at Bolling Field, D. C. The experimental equipment consisted of a 10-ft. spray bar fitted with eight nozzles. Material was held in a 50-gallon tank, and a 60-cu.ft. compressor was required. The entire equipment was loaded on a truck, and the spray bar was fitted to the back. Controls were all on the head of the material tank.

The rate of application was approximately 2000-sq.ft. a minute with a material that sprayed 300-sq.ft. to the gallon.

Color Illusions and Magic Free

The Color Research Laboratory of Eagle Printing Ink Co., Division of General Printing Ink Corp., 100 Sixth Ave., New York, N. Y., is sending out its tenth folder in the Color Facts series. This colorful folder, prepared for general amusement and enlightenment, presents a number of optical illusions which prove that seeing is not always believing. The company will be glad to send a copy of "Color Illusions and Magic" to those requesting it.

M. H. Corbin Promoted by Standard Varnish Works

J. Heath Wood, president of Standard Varnish Works, New York and Chicago, announces the appointment of M. H. Corbin to the position of manager of industrial sales and director of research in the Eastern territory. Mr. Corbin succeeds the late Paul Sommer. Mr. Corbin has been with Standard since 1937, specializing on sales and technical service in the lacquer field.

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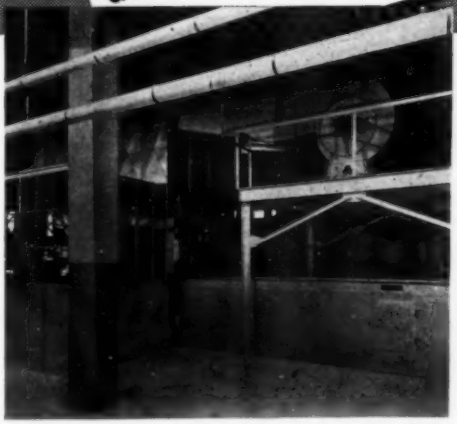

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Surface Treating New Plywood for Durability

(PART 2)

BY W. T. SMITH
Physical Testing Laboratory
Roxalin Flexible Finishes, Inc.

IT IS easy to offer an equitably logical theory on the cause of blistering of baked finishes on wood. Wood is a porous medium of which perhaps 60% or more of the volume is air space. The intricate open passages of the structural cavities absorb fluids and vapors quite readily and relinquish them slowly. When such fluids or vapors, whether water, air or coating solvents, are accelerated on their leisurely way out by greatly increased pressures due to elevated temperatures, they tend to rush the nearest exit to the detriment of the half-hardened film that blocks the way.

Oddly enough, this phenomenon gives more trouble on plywood than on solid wood, and more on resin-bonded plywood than on glued bond. This too has a logical explanation. Plywood has internal bond lines of greater or less impermeability, as well as opposed textured members, which resist the passage of vapors. The more impervious the bond line the more completely is the transmission of the vapors through the wood a "one way" situation. They have no alternative but to return the way they came in, viz., through the surface film which has meanwhile begun to set.

Blisters in Low-Bake Finishes

A particularly baffling feature of blisters in low-bake finishes is their complete inconsistency. They will appear in profusion, sparingly, or not at all, in direct succession on pieces of the same stock. They will defy efforts to reproduce or control them at will by laboratory experimentaion. One reason for this is the notoriously inconsistent nature of wood textures. Another, theoretical one, is that blisters occur most readily at points where there is a microscopic break or weak point in the bond line between the laminae. Vapor and air pressure built up in the lower adjacent lamination then escape only through this small "blowhole" and utilize it to the extent that huge blister, or group of them are raised in the film over the spot by escaping vapors.

Blistering of baked plywood finishes (by application of certain pre-

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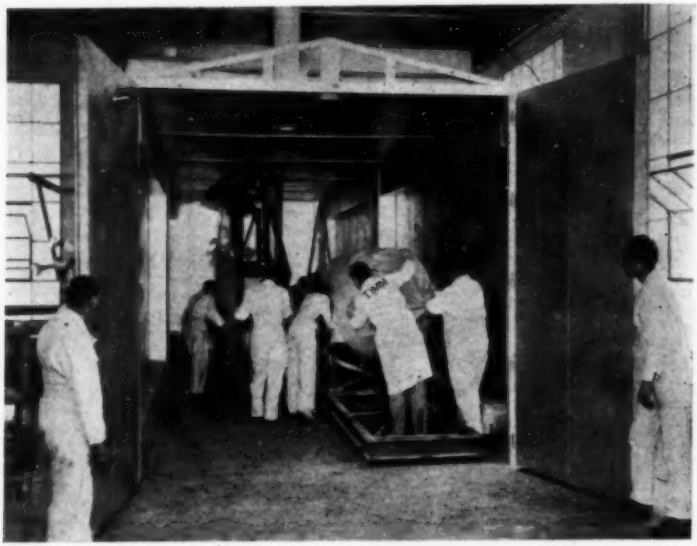

The fuselage and component parts of the Timm plywood plane are shown above, after they were wheeled into an oven and were made ready for controlled humidity heat created by the special chamber. Impregnated plywood, the plastic binder between plywood surfaces, the plastic material at all joints and the outer coating of plastic on all exposed surfaces fuse together in one rigid whole. Press Association Photograph.

cautions and controls in processing practices) can be controlled. Like most aberrations of wood finish behavior, it is kept to a minimum by control of several contributing factors to within limits of a reason able margin of safety.

The first is temperature. While resin-bonded plywood will withstand 200° F. without ill effect, it is advisable, if blistering occurs, to keep the maximum temperature at the lowest point at which the coating material can be converted —if possible, not over 150° F. The nature of the undercoat or primer used will influence the results in a measure, but if kept in the realm of conversion temperatures, it will, by its exact nature, have much less effect on blistering than might be supposed.

Perhaps the most significant element in blister control is the solvent combination used in the primer coat. The surface tension or "wetting" tendency of the solvent affects its passage into and out of the wood. The correct low tension solvent will have the faculty of permeating the interstices of the wood rapidly and of driving out the air before it, and of receding again gradually to escape without damage to the film.

The open-pore problem of such a wood as mahogany presents the necessity of filling the pores level

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with the surrounding surface. This is accomplished in two ways on any wood surface: 1) By applying a heavy wet coat of high-bodied film-forming material and then cutting down the surface mechanically to the desired condition; or 2) by rubbing, padding or knifing in a paste form of inert material to pack each pore as one putties a nail hole or a small crack.

Choice between these two methods is a matter of preference, though the filler operation is generally more satisfactory and economical of material and labor—that is if a specially and properly formulated filler is used. It should be a "filler"—not just a varnish loaded with inert—else the working properties will be so poor that the result does not justify the outlay in labor. The secret lies in the proper combination and character of inerts used and in the ratio of inert to vehicle. A proper filler that can be padded and wiped and does not require knifing to remove the excess, seems to be the ideal base, supplemented by a surfacer for mahogany plywood.

The surface glazing or "ironing out" of the surface, occasionally complained of on hot-plate-set plywood, will not often give trouble in finishing. It may be relieved by sponging or fog spraying with water if found to be troublesome.

Top Protective Coats; Phenol-Formaldehyde Types

The exact nature of coating materials and procedure of application for durable finishes on plywood are still subject to considerable experimentation and controversy. Inclination has been toward the use of fairly long-oil phenol-formaldehyde types of surfacers and top coats. Such finishes provide a satisfactory protection and represent merely a conservative "line of least resistance" stand based on previous experience with outdoor wood finishes such as on marine work. Their principal disadvantages are extremely slow drying and a certain susceptibility to the combined attack of excess moisture and very low temperatures.

Lacquer Coatings

Lacquer or cellulose type finishes have never taken a prominent place in finishes for outdoor or other adverse conditions. While their major weakness (a bond line to the wood that is very susceptible to moisture attack) may be corrected in a measure by a special sealer, they also show weakness in long exposure to strong sunlight. Their resistance to moisture and temperature extremes alone may be developed to a point beyond that of even the phenolic types.

The conventional solids range of lacquers will, of course, usually demand more coats for a suitable film than a varnish type—unless some such device as hot application is used, in which case care must be taken to avoid a decided tendency to pinholing on resin-fonded plywood where all escaping solvent breaks back through the heavy film.

New synthetic types of material having the high solids and ultra violet resistance of the long-oil phenolics and offering a compromise with lacquers in drying are being developed for plywood applications.

(To be continued)

National Safety Exposition

The 1942 Safety Congress will be held October 27, 28, 29. It will be housed in three big Chicago hotels—the Sherman, the La Salle and the Morrison. Convention headquarters will be in the Sherman.

KEYSTONE

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for
WAR PRODUCTION

KEYSTONE VARNISH COMPANY
BROOKLYN, N. Y.

Boston, Mass. **Chicago, Ill.**

Plywood Finish

A new development in finish for the fast expanding plywood plane and glider production that will release large quantities of critical metals is announced by Zapon Division, Atlas Powder Co., Stamford, Conn. This development is used in the manufacture of planes and gliders for the Army.

Features of the new war finish include impregnation of the wood and sealing to provide highest moisture resistance. It is especially designed to add a minimum of excess weight to planes and fits the high speed schedules consistent with rapid production of these craft. In addition to meeting a specific war need today, wide use of this finish is seen later, for peacetime purposes.

Protects Workers' Skin

Industrial skin disorders which, according to statistics of a major insurance company, comprise two-thirds of all occupational diseases, are being brought under closer control by protective creams, according to G. W. Sherin, chemical specialties expert of the Du Pont Co., Wilmington, Del.

In war plants where the workers' hands are exposed to oil, grease, solvents, or paints, these non-medicinal protective films are proving to be of great help, according to a recent survey.

Application of the cream is compulsory in a number of plants because it eliminates much of the lost time due to dermatitis. Some insurance companies recommend the cream to manufacturers because it helps to reduce the number of their liability claims.

A greaseless substance, called "Pro-Tek" protective cream, a product of the Du Pont laboratories, is applied to the hands, arms, and under the nails before starting work. It forms an invisible film which gives physical protection against grime and some irritating substances. At the end of the working period, it can be washed off with soap and running water, carrying the grime with it.

New . . .

MATERIALS SUPPLIES EQUIPMENT

The use of the cream eliminates the necessity of using strong solvents or harsh abrasives to remove grime, paint, and grease from the workers' hands. Such cleansing materials frequently cause irritation.

The influx of new workers, especially many women, to war plants presents a problem of double magnitude, because they tend to contract skin infection more readily than experienced workers, whose hands are hardened. Precautions against the development of irritations is of prime concern in preventing lost time in industries where maximum production of war goods must be maintained.

Among the various types of war plants where workers have been benefited through the use of this protective cream are those producing airplanes, airplane parts, ball bearings, tanks, trucks, precision instruments, machine guns, rifles, and insulating materials.

Perfect and Colorful Grain Reproductions

With drastic material restrictions and the need for rigid production economies confronting the entire furniture industry, substantial savings in finishing, drying time and materials—plus new surface beauty—are possible with Sans-Arb and Sans-Marb photo-lacquer re-creations of fine wood grains, marquetry and marbles, according to David Rautenbush, manager of the Graining Division of The Meyercord Co., Chicago, Ill., manufacturers of the material.

In describing Sans-Marb and Sans-Arb, Mr. Rautenbush claims that these

USE PROTEKTOL*— NEW TRANSPARENT STRIPPING LACQUER

EXTRA PROTECTION. Protektol was developed for the specific purpose of reducing rejects caused by rust, surface scratches, dirt and grease. This coating is particularly applicable to highly polished surfaces, such as flat sheets, molds, irregular shapes, dies and bearings—offering protection during handling, fabrication, assembling, shipping, storing and installation.

QUICK DRYING. Protektol is supplied in liquid form suitable for spraying or brushing, and may also be obtained in viscosities suitable for dipping or roller coating. Applied to a thickness of one to two mils, Protektol may be air-dried in approximately one hour. Drying time at 200° Fahrenheit is six to eight minutes.

NOT A PERMANENT COATING. Protektol is not a permanent coating and should not be left on an article when it is put to use. When metal, fabricated or in sheet form, is ready to be used, it is necessary only to lift a corner of the Protektol film with a finger nail and pull off the entire film as easily as removing a piece of paper. An air gun can also be used to blow off the film.

AVAILABLE NOW. Adequate supplies of Protektol are available now. For further information write to: Ault & Wiborg Corporation, 75 Varick Street, N. Y. C.

*Reg. U. S. Pat. Off.

IT'S A FIGHT TO THE FINISH

Ault & Wiborg finishes are now being used on shells, bombs, gas masks, expeditionary containers, and also as insulating coats for automotive, naval and aircraft wiring systems.

AULT & WIBORG CORPORATION

A SUBSIDIARY OF INTERCHEMICAL CORPORATION

materials should not be confused with one and 2-color "graining" and "marbleizing." They are perfect photo-lacquer re-creations of fine woods and marbles, employing as many as seven and eight colors, scientifically imposed upon a heavy, super-quality lacquer film in sheet form. This process provides a large part of the normal lacquer finish that would otherwise require several spraying operations. Sans-Arb and Sans-Marb are not only fine decorative materials, but lacquer finishes as well.

Hundreds of lustrous patterns in fine burls, crotches and wood grains, as well as marquetry and marbles, many rare and commercially unobtainable at present, are now available for the enrichment of furniture lines.

Extreme flexibility permits Sans-Arb and Sans-Marb to be cut to any dimension and applied to virtually all shapes, flat or molded, to any smooth surface, large or small, whether wood, metal, glass or composition. Ease of application, for either custom or line production, high drying speed and a surface equivalent of several coats of spraying lacquer (can be rubbed, sanded, shaded, over-toned and top-coated) Mr. Rautenbush reports, are proving important factors in wartime finishing.

Metalprep Prepares Metal for Paint

Metalprep, a product of Neilson Chemical Co., 6564 Benson St., Detroit, Mich., is a phosphoric acid-base metal cleaner which is prepared and shipped in a concentrated liquid form in lead-lined drums and glass carboys. Before use, the concentrated material is diluted with from two to three parts of water to one of the material, depending upon the kind and condition of the metal in process.

The solution is particularly useful where metal parts and products are prepared for painting because it does the following:

1) Removes oil, grease, waxes, rolling compounds, rust and other foreign matter from the surface of the metal in such manner as to leave the surface chemically clean and ready for paint.

2) Inhibits the rusting agents which caused rust to form originally, or which might set up new rust under the primer or surface coat. Due to the penetrative properties of its solvent, even where rust is not entirely removed, Metalprep penetrates into the pit holes and to the base of rust, thus stopping further rust development.

3) Cuts through and dissolves the hardened film characteristic of some metallic surfaces, and etches the surface of the active metals, producing a microscopic tooth, and thereby insures a firm bond between the metal and the primer or surface coat.

4) Neutralizes any alkali that may be left on metal from various sources, particularly those left after any alkali cleaning operation, thereby preventing chipping, flaking and any other troubles which sometimes follow alkali cleaning.

5) Adequately prepares for surface coating the ferrous metals (iron, steel and their alloys, including polished or hardened surfaces such as are encountered in cold-rolled steel); aluminum and the white metal alloys such as duralumin, nicrolinum, dow metal, cadmium, galvaneel; removes grease, impurities and corrosion from the non-active metals, such as lead, copper and brass, and properly prepares them to receive a paint coat.

Metalprep can be brushed on with a bristle brush and wiped off with rags, brushed on and washed off with hot water; or it can be applied by dipping or spraying.

Zinlac for Shellac

Zinlac is the result of years of research by chemists and laboratories working for William Zinsser & Co., 516 W. 59th St., New York, N. Y., who anticipated the possibility of a shortage of shellac and prepared for it carefully, painstakingly, scientifically. It is not a makeshift, hastily put out to meet a sudden demand. It has been created under the most rigid controls and standards.

DON'T LET YOUR SALES DROP

Your sales story . . . like all sales stories . . . has two chapters. Chapter one is "Your Product." Chapter two is "Competition."

And . . . as with all stories . . . you don't find out whodunit 'till you reach the end of the book.

In other words, what your competitor does may affect your sales just as drastically as what you do yourself. Product improvements in your field mean LOSS to you . . . unless they are YOUR IMPROVEMENTS.

Product improvements don't just happen. They usually require specialized engineering talent and research. It is our business to discover better ways to finish products . . . to cut finishing time, to lower finishing costs, and to improve salability . . . to keep them AHEAD of competition.

Your inquiry incurs no obligation. Address Dept. J.

STANLEY

THE STANLEY CHEMICAL CO.

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Lacquers · Enamels · Synthetics · Japans

A SUBSIDIARY OF THE STANLEY WORKS, NEW BRITAIN, CONN

Although Zinlac is different from shellac in appearance, it is amazingly like shellac, and when applied it looks and acts just like shellac. It is a straight alcohol finish and can be used and treated just as you would use shellac.

Zinlac is a finish you can use with confidence to substitute for shellac on practically every kind of job. Its properties include the following:

1) Will dry fast to the point where it can be sanded without gumming.

2) It grips into the wood; it won't peel off.

3) Will stand thinning to any desired consistency.

4) Has remarkable clarity and brings out the natural beauty of the wood. Test it on glass.

5) Will wear longer and better than old fashioned substitutes. Try to scratch it.

To get the best performance from Zinlac, remember these points:

1) Use like shellac in applying, either by brushing or by spraying.

2) To thin, use only proprietary solvents such as Shellacol, Solox, Paco and Ponsolve.

3) Do not mix with lacquer, varnish or paint.

4) Do not store in sunlight or near radiators. Keep in a cool place, like shellac.

5) Keep in glass or wood. Avoid long contact with metal.

6) To secure best results, Zinlac, like shellac, should be used within a reasonable time.

Rubber Preserving Process

A completely new and revolutionary tank-dip process of preserving rubber is announced by Transmotive Laboratories, 2550 S. Michigan Ave., Chicago, Ill., automotive chemical manufacturer. It is called Prolatex Rubber-Saving System, on which patents are pending, and consists of a vegetable base preservative and specially constructed dipping tank for application.

The Prolatex System is claimed to preserve the elasticity and resilience

Useful for coating automobile tires, too.

of rubber; to fill the pores, cracks, minor cuts and abrasions; to seal the entire outside surface of the rubber against oil, grease, gas and air as well as rubber-destroying rays of the sun; and to restore "new-rubber" appearance. In short, it is said to effectively halt "rubber-rot" or oxidation.

The manufacturer emphasizes that the new preservative, Prolatex, is not a paint and is not applied by brushing. It is a penetrant of extremely low viscosity which permits speedy absorption by the rubber. It is made of a soya bean oil base compounded with a number of materials of acknowledged rubber-preserving value.

Although the system is said to be applicable to the preservation of all sorts of rubber articles, its obviously greatest usefulness is in tire preservation. The specially designed dipping tank permits the application to tires while on the car. The application thus performed by immersing the tire is not only more adequate and uniform on all contours of tread and wall, but also is much faster than brushing and, according to the manufacturer, requires only from 20 to 30 minutes to treat

LET'S GO!

3

TIMES FASTER on all Sanding!

FORGET labor shortage on sanding. ***Any*** green hand is an expert with the Sterling "Speed-Bloc" sander. Any green hand can do THREE MEN'S WORK, and do a BETTER JOB, with "Sterling". Get that "STERLING" SPEED and PROFIT that others know! WRITE! Sterling Tool Products Company, 365 East Ohio Street, Chicago, Illinois.

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Plug-In Compressed Air Driven

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365 E. OHIO STREET CHICAGO, ILL.

all 5 tires on a car. The cost of the treatment to the car owner has been established at 50c per tire. The system also provides a preservative for white walls at a slight additional charge.

Prolatex Rubber Saving System, the manufacturer states, is already in use by a substantial number of car dealers and service stations from coast to coast and has already received the approval of car manufacturer service departments.

Coats Insides of Steel Shells

The Zapon Division, Atlas Powder Co., Stamford, Conn., recently perfected for the army, a new straight phenol-formaldehyde finish, to coat the interior lining of new steel shell cases which are now authorized by the Government to conserve critical brass. Known as S-198-C in the Zapon series, the new Zapon finish protects the inside walls of the new type shell cases against conditions of use or corrosion caused by the action of powder, rust or other agents.

Zapon laboratories worked with the army from the inception of the project and the company is gratified that this finish more than fulfilled the rigid military requirements. Only a formulation of the most exacting standards will meet the exacting specifications required. The motto before all concerned in this project was "there must be no duds here" . . . here being the few square feet behind the gun in action, somewhere on the battlefield.

"Ron-Glo" Luminous Paint

T. J. Ronan Co., 749 E. 135th St., New York, N. Y., announces a paint that glows in the dark to safeguard life, health and property during blackouts. Objects or areas painted with it are visible at not more than 100-ft. in complete darkness.

The manufacturer points out that small luminous symbols, signs, etc., are of vital importance to show the exact location of protective equipment and to outline all danger points on the interior as well as the exterior of buildings.

Ron-Glo is applied the same as ordinary paint, by brushing or spraying. It absorbs sunlight or artificial light, and then glows with a soft white light in complete darkness for a long period. Because Ron-Glo is visible only at a distance of 100-ft., it cannot be seen from the air, hence, it is ideally adapted to all blackout requirements.

Exhaustive tests show that the soft glow of Ron-Glo will not diminish for a long period. For instance, a panel coated with Ron-Glo was exposed for three minutes under a regular 100-watt bulb, and another one to bright sunlight for three minutes. After the first hour the glow diminished slightly, but at the end of eight hours the glow continued brightly. After 48 hours it was still visible.

Hose Cleaner

Inasmuch as it is so important now to prolong the life of material hose, as well as to keep it always in condition for delivering clean material to the spray gun, Paasche Airbrush Co., 1909 Diversey Parkway, Chicago, Ill., calls attention to its Type F1002 hose cleaner. Quoting from the company's literature:

"It's easy to clean material hose with this new hose cleaner. Simply fill the cylinder with solvent, connect hose to be cleaned to outlet at bottom and connect airline to inlet on top. Solvent is forced through the hose under pressure; its flow is controlled by an adjustable needle valve. When the solvent has passed through the hose, a strong blast of air follows, thoroughly clean-

Berry Brothers FIR WOOD SEALER

Solves the problem of sealing FIR PLYWOOD

Berry Brothers Fir Wood Sealer solves the problem of sealing *fir* plywood. *Seals* and *stays on surface*—is not absorbed. Good base for finishing coats—fewer coats needed to produce full, uniform luster. Holds wood fibres down. Reasonable in cost.

Plywood, finished with Berry Brothers Fir Wood Sealer, is an ideal substitute for critical metals in pre-fabricated houses, trailers, furniture, cabinets, shelving units, display fixtures, card tables, tool boxes, work benches, farm implement parts and brooder houses.

Write for complete information on Berry Brothers Fir Wood Sealer today.

Quality Finishes Since 1858

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Industrial Varnishes • Enamels • Lacquers
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ing and drying the hose of all solvent and paint particles. The unit saves time and facilitates those cleaning jobs which color changes necessitate.

"A mounting bracket is provided so the unit can be attached to the spray booth or other convenient location, where it will be handy at all times. The air inlet is ¼-in. The solvent outlet is ⅜-in.; all standard pipe threads. Overall height is 12-in. Wt. 3¼-lbs."

Insulating Varnish Is Flame Resistant

The Sterling Varnish Co., 141 Ohio River Blvd., Haysville, Penna., has recently developed a new flame-resistant insulating varnish, designated as R-878, which is recommended for class B high-temperature insulation.

This new varnish is mechanically strong and dries all the way through when applied to electrical apparatus. After drying, R-878 will not support combustion, when the flame is removed, neither will it melt nor resoften under operating temperatures. In addition to good heat-resisting qualities, it has all the characteristics of high-grade insulating varnishes.

This new flame-resistant insulating varnish is one of the many contributions of the Sterling Varnish Co. to the all-out war effort. The manufacturer will be pleased to furnish additional information on request.

Quick-Drying Synthetic Finishes

A revolutionary development announced by E. I. du Pont de Nemours & Co., Inc., Wilmington, Dela., is the short-bake synthetic finishes of the urea-formaldehyde resin variety. Long used in plastics, this resin had resisted efforts to make it suitable for paint. For one thing, it was too brittle. Research, however, has licked that difficulty and industry today is turning out a multitude of its vital products with this new finish which is baked dry in a short time.

The sight of guns, tanks and planes impounded while their protective coatings dry is enormously less than during World War I. This is because of tremendous recent advances in paint technology.

The Du Pont laboratories have also perfected a synthetic type of camouflage airplane finish. First adopted by the British government, this product, which does not rely on imported resins and gums, is now used largely by the U. S. Army and Navy Air Corps.

In addition to the fast-drying quality typical of synthetic finishes, the "Dulux" type camouflage paint for planes is highly resistant to the destructive action of de-icing fluids. Thus are avoided many ill-spared hours on the ground repairing the havoc raised by fluids spread on plane wings to prevent dangerous ice formation.

Bomb Fuse Dipping and Drying Oven

A typical example of the production of heat-treating and drying machinery being built by the Lanly Co. of Cleveland, Ohio, is the continuous gas-fired fuse dipping and drying oven illustrated here.

Bomb fuses are placed in baskets which are hung on the conveyor. They are then carried through a pre-heating zone, into the lacquer dipping tank and then through the drying chamber. The temperature range is from 100° to 300° F. and is controlled uniformly by automatic instruments.

The volume of production, which is a military secret, is tremendous.

Matches Steel Line in Wood

Vogel-Peterson Co., "The Checkroom People," Chicago, Ill., whose steel wardrobe racks and costumers are widely used for employe "lockers" in both offices and factories, have just brought out a line of all-wood units which are so closely identical in design and finish to the Peterson steel racks that they can be used as add-on units for existing installations.

Protective Coatings
For Government Needs

At Hilo, all facilities are devoted to the furnishing of Protective Coatings to meet the need of Government Agencies and for you manufacturers who require Government Specification Finishes for what you make.

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PROTECTIVE COATINGS
for all Government Uses

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Inspection and approval of some Government Finishes are required at our factory before shipment. Nevertheless, you may have, on all Government Finishes, the Hilo Guarantee that they will meet the specification for which they are intended.

You are invited, as prime contractors or sub-contractors on Government work, to bring to Hilo your questions on Protective Coatings. Our Technical Staff will aid you without obligation. Our Production Department is ready to serve you.

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BROOKLYN, N. Y.

2420 Washburne Ave.
Chicago, Ill.

Park Square Building
Boston, Mass.

Established 1863

Questions; Answers

Questions are welcome and will be answered promptly by mail. Readers are invited to prepare and send in additional information relating to any of these questions and answers.

How to Remove Traces of Chromic Acid

We are having difficulty in removing chromic acid from aluminum castings, which we find necessary to redip. Will you please give us a formula that will remove the chromic acid?—N. Mfg. Co. (Propeller Anti-Icing Equipment).

The generally approved method of removing chromic acid from aluminum castings is to dip them in a hot-water (180° F.) rinse, and then immediately afterward dip them in a cold-water rinse. Naturally these rinse waters must be kept clean and fresh to be effective. The rinsing operations should closely follow the chromic acid dip.

After the rinsing operations the surfaces of the metal should not be touched by human hands. If they must be handled, workmen should wear clean gloves.—ED.

Spray Exhaust Problem

Due to priorities and shortages, we would like to move our paint shop from the basement to the third floor of our building. We have encountered no end of trouble with the exhausting of fumes from our spray booth. While the finishing room was in the basement, we exhausted the fumes out an open window into a canopy that exhausted to the ground, thus allowing fumes to escape but no pigments.

Our problem is how can we exhaust fumes from the third floor out an open window without running a stack up five floors to the roof of the building, a plan which the building manager does not approve of, inasmuch as it would spoil the appearance of the building. Of course, spray-booth manufacturers would like to sell us a water-wash booth, but we in turn would like to make use of available equipment which has served us satisfactorily and is practically new, considering the time this equipment has been in operation.

Running the stack to the roof or the purchase of a new booth involves a considerable amount of money which we would prefer not to spend at this time. We have thought of extending a pipe through an open window with an elbow turned down and a baffle about 2-ft. from the opening of this pipe which would collect the pigments but would disburse the fumes over the sides, thus preventing pigments from being carried away by the air currents. We have also thought of putting about 3-in. of water in a pan in the same baffle to collect pigments. Do you think this would work? Your advice in offering us a solution to this problem would be sincerely appreciated.—O. R. Corp.

While the water-wash booth probably costs more, it does offer a safe and satisfactory solution of such a problem. The maintenance cost is low and the danger of fire

and explosion is very much less—in fact, these dangers are almost eliminated.

You might investigate spray-booth filters, as advertised on page 65 of August 1942 issue of this magazine.

The makeshift you propose in the last paragraph of your letter is likely to be ineffective and unsatisfactory. However, you can go a step farther along this line and fix up a makeshift that will probably work some better than the one you suggest. Arrange your exhaust pipe to elbow down into the top of a covered tank of water which has another large exhaust pipe elbowing out of it and extending through the outside wall.

The water level in the tank must be considerably lower than the top or cover and the lower edges of the exhaust pipes—in fact, there should be almost as much space between the top of the water and top of tank as the diameter of the exhaust pipe. Also, the outlet exhaust from the top of the tank should be two or three pipe diameters from the inlet.

Of course, this longer, multiple-turn exhaust pipe naturally offers more resistance to the movement of the exhaust air, therefore you will need more horsepower to drive your exhaust fan—or more probably, a larger exhaust fan plus a larger motor.

Another plan is to use interlocking open-joint baffle plates in the back of the booth put in front of the exhaust fan. These plates will catch part of the pigment from your waste spray, but they will require frequent cleaning (should be cleaned daily), more exhaust fan power (because they retard the flow of air) and they are a fire hazard because of the continual collection of finishing material on them.

As you know, anything that is a fire hazard is very dangerous. While a program of regular, thorough and careful cleaning may get

WAR MEMO ★

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EVERYBODY EVERY PAYDAY 10%

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started satisfactorily and be continued for a while, eventually those responsible get tired of it or become careless, lax or forgetful in their work. Then you are inviting a fire or explosion that may prove disastrous. Of course, examples can be found where a very hazardous condition prevails for years and no fire occurs, but why trust to luck? Why risk so much for so little when the odds are stacked so heavily against you? — JOHN SMITH.

"Detearing" Process

We understand there appeared in INDUSTRIAL FINISHING, quite a few months ago, an article describing a new process for applying finishing materials by dipping. We understand this is known as the "Detearing Process," and that the apparatus required is manufactured and controlled by Harold Ransburg Co., Indianapolis, Ind.

If available, will you kindly send us a reprint of this article and if any charges are involved, please advise and we shall remit promptly. —V. Varnish Co.

The "Detearing Process" you ask about is not dipping equipment or a dipping operation, but it is an important operation performed immediately after dipping to remove the objectionable beads or tear drops and fat edges that cling to the lower edges of dipped articles after the flow-down of excess material has stopped.

The solution of the problem, as worked out by Harold Ransburg, is much more simple than any mechanical method you can think of. The beads and fat edges form, but at the proper point along the conveyor line—at a point where the flow-down of paint has substantially ceased—the articles pass through a high-voltage electric field.

As soon as the freshly coated products or parts enter this electric field, any drops or fat edges that remain are immediately repelled from the work with such force that the excess paint flies out into the air in small thread-like sprays and stringy particles—some visible and some invisible. The thin film of coating remains and levels out smoothly, leaving no trace of the beads or fat edges.

An illustrated description of the equipment was published in Dec. 1940 issue of INDUSTRIAL FINISHING Magazine, and reprints of it were ordered by the Ransburg Co. We are sending you a copy.—ED.

"Phosphate Treatment" for Metal

We are interested in obtaining information regarding the "phosphate treatment" of metal, as called for in government specifications. Since this treatment is entirely new to us, we have at present no knowledge concerning same. If you are in any position to give us the information required in the application or purchase of this phosphate treatment, we would be more than thankful.—N. Machine Co.

W. H. Rohr, editor of INDUSTRIAL FINISHING Magazine, has requested us to send you information on Bonderizing and Parkerizing, which we are forwarding under separate cover.

We note from copy of your letter to him that the Government specification calls for "phosphate treatment." Either of these processes would come under this head-

s the FINISH you're using giving you

ALL THESE THINGS?
Varnish Body and economy
Hard—mar proof—print resistant
Dust free in 30 minutes—to
Smooth, satiny, clear rubbed luster
Durable—flexible—check resistant
Air dries overnight—force dries in 2 hours
Rubs clear—non graying or blooming
Non settling—non skinning—non shrinking

IF NOT SEND FOR *FREE* SAMPLE OF TUF-TEX

Let us help you end your finishing troubles with Sateen Tuf-Tex, the new Reliance varnish that combines the best qualities of both lacquer and varnish. Tuf-Tex will improve and speed up your finishing—save you money if you are now using lacquer—and still maintain quality. It will pay you to investigate Tuf-Tex. Write us for samples.

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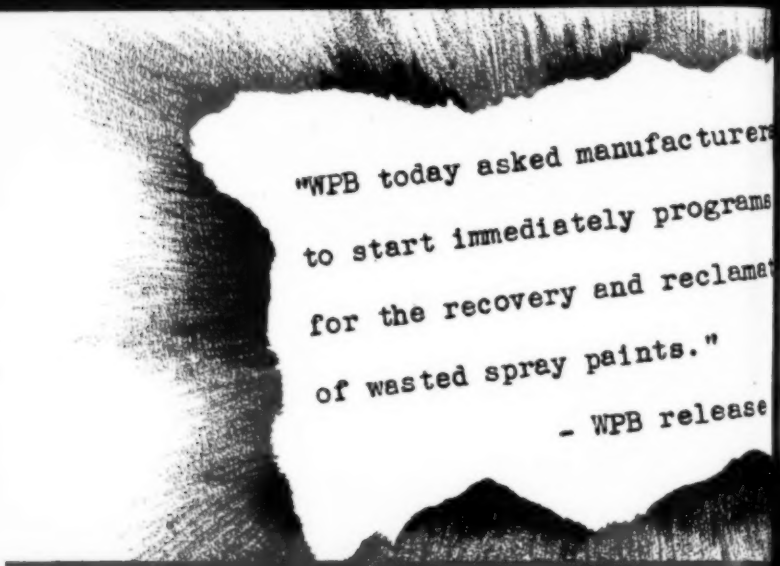
THE LIFETIME FINISH


"WPB today asked manufacturer
to start immediately programs
for the recovery and reclama
of wasted spray paints."
- WPB release

OK, WPB, here's how Binks can hel

Salvaging materials from the "over-spray" of spray painting equipment is a two-step job. First, the over-spray has to be collected, then it has to be reclaimed. Binks Dynaprecipator Spray Booths will perform the first step . . . and your paint supplier can perform the second.

Binks Dynaprecipator Spray Booths literally wash the over-spray and fumes out of the air. This is done by drawing the air from the spray booth through a special curtain of water. The paint is caught in the moving water and is precipitated in the form of sludge, which is easily collected for delivery to the paint reclaimer.

Water Wash Spray Booths are not new . . . but the principle on which Binks new Dynaprecipator Spray Booth works is new. Recent improvements in design have increased the efficiency of Dynaprecipator Spray Booths to an all-time high.

Binks engineers will be glad to help you in every way possible to salvage the over-spray in your plant. If we are to out-produce our enemies, we must start conserving now . . . and finishes are no exception.

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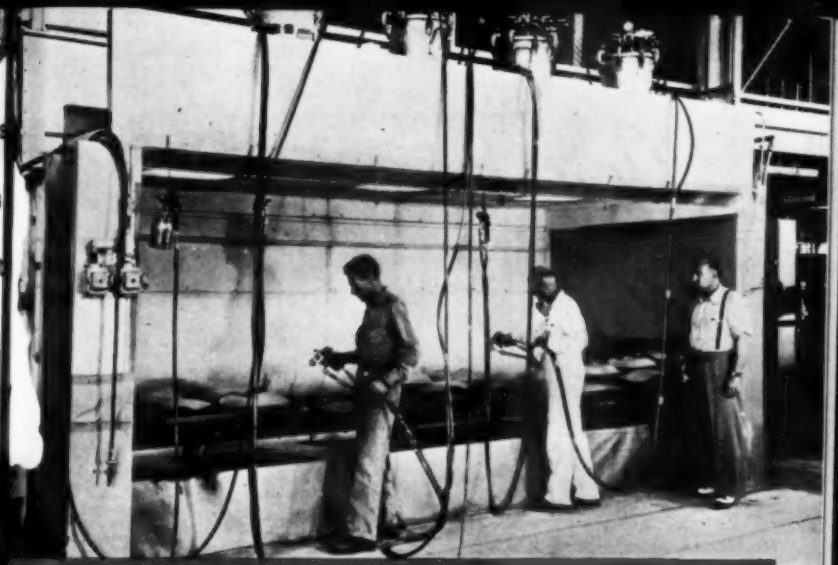
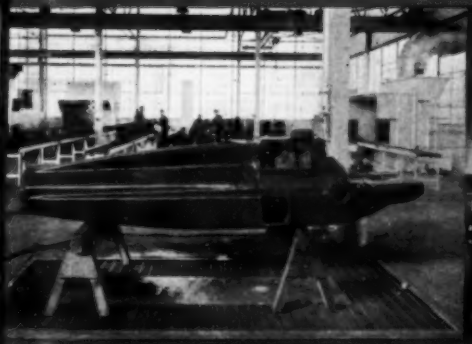


help manufacturers to recover waste paints



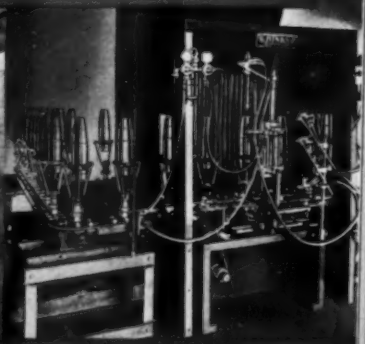


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Photo by U. S. Army Signal Corps

DAY and night, in the hot sands of Africa and in the bleak, cold fogs of the Aleutian Islands, American war materials are attacked by an enemy that has no respect for the toughest steel – attacked by Nature's blitzkrieg forces: the sun, the rain, the wind, heat, cold.

Permite Industrial Finishes, for exterior, interior and product use, are designed to defeat these foes and other destructive elements.

Manufactured to U. S. Government specifications, Permite clear and colored ammunition lacquers, camouflage paints, zinc chromate primers, olive drab enamels, rust inhibitors, mixing varnishes and Permite Heat-Resisting Ready-Mixed Aluminum Paint (the latter on WPB allocation only) will solve your War Production finishing problems.

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ing. Bonderizing is recommended where the final finish is to be a baked-on paint. Parkerizing is recommended for use under air-dry paints, lacquer or oil.

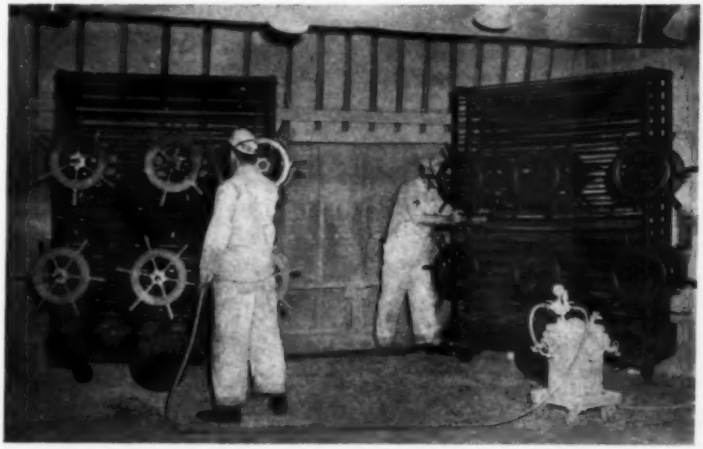
Will you please advise what articles will be treated, sizes, hourly production, cleaning facilities and steam pressure available at your plant? Also, what the final finish will be and under what Government specification you will operate?—PARKER RUST-PROOF CO.

Ship Wheels

SHIP WHEELS normally made by craftsmen specializing in marine woodwork and frequently without the benefit of modern machinery, today are being turned out on a mass production basis in the plant of Joseph Kaszab, Inc., Chicago, Ill., manufacturer of custom-built store fixtures and architectural woodwork. The company's factory is turning out wheels that shortly will direct the course of hundreds of landing and pursuit boats for America's armed forces.

Manufacture of ship wheels in a Chicago wood products manufacturing plant not only extends production speed-up to another branch of American industry, but marks a decentralization of manufacturing not common in boat construction. Wheels made and finished in this Chicago establishment are being shipped almost the breadth of the country, to be installed on boats being built in New Orleans and other distant shipyards.

The order is believed to be the first involving wood production for the marine industry being filled by a Chicago plant on a sub-contract basis. Wheels are being cut, assembled, formed and sanded at the company's main plant, and then transferred to the company's finishing plant nearby for painting.—W. R. H.



Spraying wooden ship wheels which are temporarily mounted on portable racks in booth.

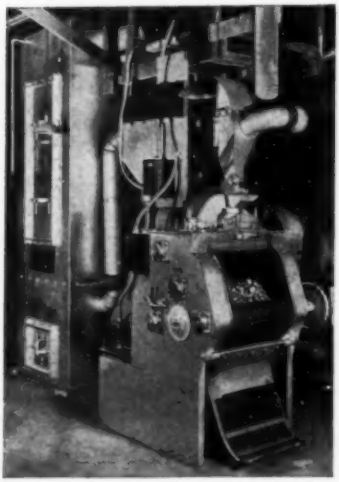
Testing Cleanliness of Metal Parts

FOR blemish-free metal finishing, such as enameling, plating, galvanizing, tinning, etc., it is imperative that the product be chemically clean; that is, free of all foreign material.

Although these parts may appear to be clean as they come from the cleaning room, it is entirely possible that traces of sand, scale or other extraneous material may still be adhering to parts of the surface. When that happens, rejects in the finishing room become a certainty, with a consequent waste and loss of production.

There are a number of simple tests, which can be made in even the smallest shops, to determine the chemical cleanliness of such metal pieces after the cleaning operation.

The simplest of all tests on iron castings, forgings, sheet steel (except stainless), etc., is to make a saturated solution of copper sulphate (blue vitriol) to which a slight amount of sulphuric acid (2%) has been added. The use of this solution serves to detect the presence of iron, or any form of iron including its alloys, by forming a bright yellow copper coating on the surface of the article tested.



Door of blast cleaner opened to permit inspection of parts being cleaned.

Where sand, iron oxide, or foreign material is present, the substance will remain in its original color or may be blackened.

The material suspected of being chemically unclean can be tested either by immersion in the solution or by rubbing the solution on the work with a swab, such as the type used for throat painting. Special emphasis should be given to the fillets and cavities in the piece, if enameling or plating is to follow. It is a good idea to renew the solution or to redip the swab for each test to be made.

In checking the cleanliness of a complete batch in the cleaning machine, it is advisable to test pieces from various parts of the load to make certain the entire load is cleaned. Should certain pieces still have some traces of foreign material adhering, a few minutes longer cleaning application becomes necessary.—A. E. F. Co.

Director of Engineering for Fostoria

Willard S. Crandall has been named to the position of director of engineering for The Fostoria Pressed Steel Corp. He succeeds Lieutenant Ray N. Green, who entered the service of the armed forces.

Mr. Crandall's first connection with Fostoria was as western district manager, later assuming managership of the entire western division. He held that position until early in this year, when he was called to take over product development activities at the factory.

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Editorial

Painting Shells

Inasmuch as the painting of ordnance shells has provided a new experience and not a few problems to many individuals and concerns, and since different materials are offered for this work, we believe that the following letter contains something that is timely and of practical value. It comes unsolicited from an experienced paint service man:

"I have read a few articles on the finishing of shells but for the most part these have been devoted to cleaning operations and descriptions of automatic spraying machines.

"Perhaps my experience will be helpful. In the first place, Government specifications covering ammunition lacquers are much too broad. This has resulted in no end of confusion. The Ordnance Department is cognizant of this fact and is now revising its specifications to conform more closely to the actual requirements.

"The present specification allows practically any gloss, from dead flat to glossy. I have seen civilian inspectors refuse to pass a finish because it was too flat, although the Specification No. 3-162A stated 'eggshell.'

"Further, the lacquers must be modified to conform to the type of equipment being used for finishing. As is well known, lacquers for use in automatic spraying machines must be very opaque. Methods in use in each plant also require formula modifications. In the manufacture of a 75mm, high-explosive shell, a reinforcing plate is welded to the back of the shell. The resultant welding causes the shells to retain considerable heat.

"In other plants the cycle of the revolving table of the spraying machines is only 75 seconds. This obviously was an error in design in the engineering department of the equipment manufacturer, but it had to be corrected by modification of a solvent mixture.

"Most complaints arise from poor cleaning. This can be traced to the fact that private shell turners have duplicated the processes in use at

the Government arsenals. These cleaning methods are at least 20 years behind the times. It is a well-known fact that the civilian inspectors refuse to pass the finish on shells in privately operated plants, when comparison proves that the adhesion of the finish is at least as good as on samples furnished from government arsenals.

"My blood pressure has risen several points when I have had good work turned down because it was not uniformly covered, while the arsenals seem to get by with a mist coat."

Protective Coatings for Everything, Everywhere

Paint chemists, technicians and formulators have performed near miracles in the development of materials needed for both war and civilian industries. Effective substitutes and alternates have been brought forth to take the place of old familiar materials which are practically out of the production picture today. The valued characteristics, such as quick drying, excellent adhesion, smooth flowing and durability are largely retained —provided the materials are used according to directions.

The important matter of using materials correctly and having surfaces clean to which they are to be applied, still applies with increased emphasis. Old timers know these things well, but many new people now in production paint rooms have yet to learn how important this matter of cleanliness is. Where the paint is applied by spraying, the compressed air (which you can't see) must be clean. Filters must be in the lines to remove the oil, moisture and occasional small particles of foreign substance — and these filters should be cleaned daily, or better still, at night after work and in the morning before beginning work, but especially in the morning.

Manufacturers of paints, varnishes and lacquers have come forward with many new materials that are of direct use and in urgent demand in connection with the war effort and related war work. Among these are improved camouflage paints, luminous paints that glow in the dark, paints particularly adopted to baking with infra-red lights, acid-proof and corrosion-proof coatings for use on certain metal surfaces, waterproof sealers for plywood due for outside exposure, and finishes for airplane wings that must withstand the destructive action of de-icing fluids. And, of course, productive coatings on war materials and equipment must be such that they will withstand any climate because this war equipment and these war materials are going into service all over the world—into the tropics, sub-tropics, temperate zone and near the polar circles; in the air, on land and sea and under water.

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Camouflage Painting

Camouflage has become a technique of great importance in practically all countries and especially in those localities that have been, are being, or may be observed, photographed and bombed by enemy aircraft. The object of camouflage is to conceal the identity and location of various landmarks and targets. Successful concealment of man-made buildings, roads and equipment of all kinds consists of making them appear like works of nature characteristic of that locality. Certain paints and other materials are being used extensively in camouflage work.

An example of some excellent camouflage recently came to our notice. One of our friends has been in a locality that we are not at liberty to disclose and he gives an interesting account of considerable camouflage work which, he declares, is really effective. He applied it to buildings and other things. First a coat of wet sand-colored paint; then a covering of sand such as is characteristic of that locality. It so happened that in part of the

locale there was sand of a dark shade, caused by the presence of "guano," which our large dictionary defines as the partially decomposed excrement of sea fowl. In reference to this he said:

"The bird guano sand was my secret to break up contours and create sand riffles. By shoveling the manure with a most artistic touch of the shovel (Mexican drag line) the corners of buildings were blotted out and the pitch, ridge and eaves of the roofs were made to resemble the shape of the rocks on the shore."

Naturally a different treatment would be needed in other localities, but this straw in the win points out a practical suggestion.

Trend in New Furniture

A news release from the Los Angeles Furniture Mart gives some highlights on what was shown at the Summer Furniture Market and reveals interesting trends in the latest design and finishes.

Many upholstered pieces and bed divans without springs or with various devices to give comfort with a minimum of metal, attracted the most attention. Buyers sampled these generously to the surprise of the makers who had brought them out in an experimental mood. One solution in springless upholstering consisted of body contour types of chairs and davenports built on sleepy-hollow lines. One firm enlarged and improved a line first shown last January which had springs in the seat base only, springless backs, channeled or buttoned, and staple cotton or curled chicken-feather cushions.

In case goods, firms brought out more new numbers designed for defense homes. Most of the defense

IT IS NOT TOO EARLY

to be giving thought to changing and improving the finish on new holiday items with a spray coat of beautifully colored

COTTON WOOL OR RAYON FLOCKS

Eye appeal and a velvety touch are important contributions to easier selling of items thus coated. The small increase in cost is easily more than recovered through the immediate interest of buyers who want "novelty" to sell. Many Patriotic novelties can be enhanced in beauty with RED, WHITE AND BLUE.

Write to Headquarters for Samples and Color Cards.

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groups were modern or modern with Early California influences in the gay textured covers, exposed wooden frames on the upholstered pieces, and opaque finishes. These had a pleasant, provincial charm that hit the right note between the functionalism of modern and the popular appeal of Early California. All were large open stock groups built on section lines with many interchangeable pieces.

The swing to modern continued in medium and better case goods with Chinese modern the predominating high style note. Ash was the most common alternate for the Philippine hardwoods, such as tanguile, formerly used. Many interesting versions of wooden pulls were shown and there were ingenious pulls formed by part of the drawer front. Even wooden hinges were shown by one company.

The gay colors in upholstery covers spread to finishes too. Not only occasional pieces, but entire suites were shown in clear, bright stains and semi-opaque stains such as Celadon green combined with teaktone in Chinese modern, ebony tops on blond cases and soft, opaque greens. A defense home group and some Early California were shown in a clear bright yellow stain.

Early California maintained its popularity, particularly among the Southwestern dealers. Lines were simpler; the hand-painted decorations, though colorful, were often limited to accent notes and the finishes were lighter. A new one, called Meerschaum, was a creamy off-white. Wooden pulls replaced the usual wrought iron, and some were carved and painted in flower motifs while others were bound in fiber and finished like the case.

Let's Do More to Prevent Fire Damage

Fire Prevention Week is observed every year during that week in which October 9, the anniversary of the Chicago fire, occurs. But this year the war has given Fire Prevention Week unusual significance.

The Nation is preparing to defend itself from fire that may be caused by incendiary bombs. Equally vital is the need to prevent the slow-down of war production by fires that may result from sabotage or ordinary causes. And, at this time when we are facing material shortages, replacements in the home and elsewhere must be reduced to a minimum.

One of the objectives of this annual observance is to teach us how to eliminate the causes of fire. Carelessness and negligence are at the bottom of most of its causes. It is estimated that more than one-fourth of all fires are preventable, with a large share of the rest being partly preventable.

Provision of protective equipment is complicated at present by the fact that many of the materials used in the manufacture of fire-fighting equipment are needed by the Army and Navy. It is essential, therefore, that we take better care than ever before of existing equipment and learn how to use it more effectively.

Vinylite Resins Booklet

"Vinylite Resins, Their Forms, Properties, and Uses" is the title of a new 20-page illustrated booklet just released by the Plastics Division, Carbide and Carbon Chemicals Corp., Unit of Union Carbide and Carbon Corp. It describes briefly the four major types of vinyl resins and the various plastic materials produced from them including, rigid sheets, flexible sheeting and film, molding and extrusion compounds, adhesives, and resins for surface coatings. In addition, the booklet contains tables of properties as well as charts showing the principal applications of Vinylite plastics. Incidentally, the cover is protected by a high-gloss coating based on a Vinylite copolymer resin.

Manufacturers interested in essential civilian or wartime applications may obtain copies by writing the Plastics Division, Carbide and Carbon Chemicals Corp., 30 E. 42nd St., New York, N. Y.

Makes Glue Go Farther

Because of the shortages and extreme high prices of glue, the Tamms Silica Co., 228 N. La Salle St., Chicago, Ill., has developed a new extender under the trade name Micromite. Micromite Glue Extender is a finely uniformly ground mineral especially prepared as an extender for all types of glue. The manufacturers recommend that as high as 25% be added to the glue. This will produce a greater quantity and at the same time will add body and provide a good free-flowing glue.

Micromite is furnished in 50-lb. bags and is available in any quantity for immediate shipment. Samples will be sent to manufacturers wishing to test Micromite Glue Extender.

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Spray-Painting Moldings a Different Color

A UNIQUE template which permits the spraying of stripes on raised moldings has saved many man-hours for the shops of the Los Angeles Railway Co. With this equipment, any painter can do a striping job in about 65% of the time formerly required, the management reports. The striping job is actually almost as fast today as a flat spraying job. A man is able to work just about as rapidly as he can walk along a scaffold.

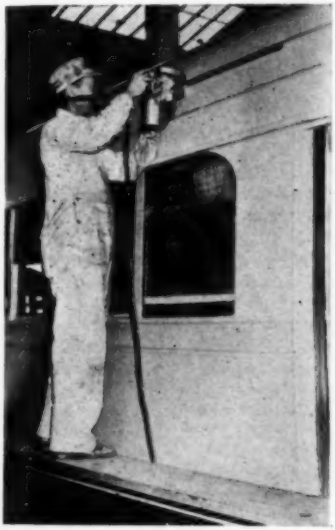
The template used is shaped very much like a kitchen loaf pan. It is made of light-weight sheet metal, fastens to the spray gun with a clamp and can be attached or removed in a matter of seconds. Two ends of the clamp are riveted to the template. The other ends are drilled for a bolt which fastens onto the spray gun.

In the bottom of the template or pattern is a slot just wide enough to fit the molding to be sprayed.

The templet is fastened to your spray gun.

Sides of the pan at the points opposite the bottom cut are cut clear, permitting the template to fit down snugly over the molding.

The gun is so centered that a fine spray hits the middle of the opening and flows out evenly over the surface to be covered. There's

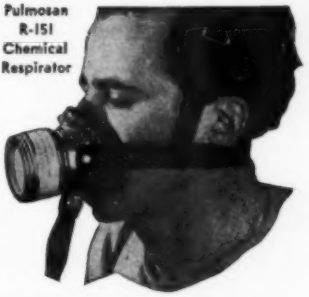


You can spray moldings easily and rapidly.

no smearing or running, and no trick is involved in using the equipment. Any man who can use a spray gun can paint wide stripes by this method.

The Los Angeles company uses templates of three different sizes to fit the various moldings on the street cars and buses which the shop must repair and repaint from time to time. In every case, the width of the slot is carefully fitted to the dimensions of the molding. The templates are made in a few minutes time, in the company's own metal-working department.

Pulmosan R-151 Chemical Respirator



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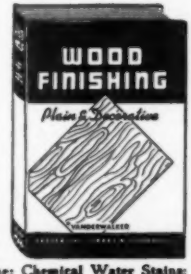

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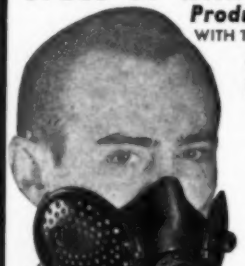

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2367 Warren Blvd. Chicago, Ill.

Linseed Oil Coating Prevents Rust

I FIND that linseed oil is a very good corrosion proofing material for metal tubing and parts that cannot be reached by paint. It can be used by pouring it into openings until the tube is full, and then draining it out or it can be put under pressure and forced into places where it would not reach by its own weight pressure, especially in and around welded structures. Then it can be drained off. When the oil is dry it forms a very tough film. It has the appearance of a light rubber coating and a very good thickness of film will be formed. Also, parts can be dipped in the oil and hung up to dry.

I would suggest that if the parts are to be cleaned and painted later, this linseed oil coating should not be used, because in the cleaning of these parts you will find that the linseed oil forms such a tough film that even lacquer thinner will not take it off. In such cases, instead of using linseed oil as a temporary rust preventative coating, I would suggest that the surfaces to be protected be dipped in some light oil that will be easy to remove.—S. L. S.

Secret of Coating Small Parts

ABOUT two weeks ago I called on a firm that was having trouble with an automatic dipping and centrifugal machine. This recalled to my mind similar instances during the first World War, therefore it occurred to me that it might be helpful if I sent you a reminder as to the correct procedure in this work.

Score — Flying Fortress-6; Zeros-0

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CAPTAIN HEWITT T. WHELESS, D. S. C., Army Air Corps., brought his lone Flying Fortress through a squadron of Zero fighters to bomb six Jap transports. His bomber crew shot down six Zeros. After the engagement he made a belly landing with all but two of his controls shot away. This is just one of many notable feats performed by our gallant Fortress pilots. The men at Boeing and all of us on the production front who contributed to the production of Flying Fortresses and their equipment are proud of our airmen.

Our production facilities are devoted to the manufacture of government specification protective coatings. Listed here are just a few of the war products now being coated with our materials.

Phone, wire or write and let one of our finishing experts help you "keep production rolling."

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As you know, in the current war work, the Army and Navy are calling for millions of small parts. Some of these are complicated and it would be too expensive an operation to set them on trays, spray them and have them turned over.

Before the articles are dipped in any paint or enamel, they should first be dipped in whatever solvent is being used for that paint or enamel, in order to get them thoroughly wet. Then when they are dipped in the paint, the paint will follow the wet surfaces, resulting in a more even coating, with no bridging. Then it can be tumbled or whizzed off, and you will have a better job in every respect. The painted articles can then be poured into trays—and shaking the trays occasionally will prevent adjoining articles from sticking together.

Probably there are many old timers who know about this trick but many new finishers may not have had this experience. At any rate, I am passing it on for whatever it may be worth to you.—E. M. STEPHENSON.

R. F. Ohmer Now Colonel in U. S. Army Air Forces

R. F. Ohmer, recently resigned as president of New Wrinkle, Inc., Dayton, Ohio, reported for duty August 1 as a colonel in the U. S. Army Air Forces. Colonel Ohmer was temporarily stationed at Patterson Field, Ohio, pending assignment elsewhere.

A veteran of World War I, Colonel Ohmer was overseas with the 37th Division, entering the service in 1917 from the Ohio National Guard.

During Colonel Ohmer's absence, New Wrinkle, Inc., is under the direction of Mr. J. C. McCorkhill, general manager.

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Production Furniture Finishing

TO THE CARE of the finishing department of a furniture factory is entrusted, for final development, the consummation of all the efforts that have gone before. Furniture that reaches the finishing room door means more than a mere assembly of bare wood parts pieced together in certain shapes and forms and ready to receive its color and protective coatings. It represents the skill and creative art of the designer; the quest for a careful selection of woods and veneers; the treatment and conditioning of those woods and veneers, and the shaping, molding and assembling of them. It also represents financial investments in plant, machinery and inventories, plus the labor of hundreds of men.

Indeed, the responsibility of the finishing department is great—and upon the skill and care exercised here depends largely the success or failure of each suite of furniture. The function of the finishing department is to not only apply coatings to protect the furniture, but also to give it color which will make it most desirable and which will bring out the beauty of the wood. And just as it is true that a fine finish on furniture will accentuate the beauty of design and wood grain, so can a poor finish obscure these fine woods and disfigure the article's whole appearance.

In these furniture plants, each superintendent realizes that for the finishing room to produce its best results, the furniture in the white must be received in the best possible condition. This means the elimination of all cross-grain sanding scratches, and the filling of all open joints, nail holes or other defects in the wood with suitable crack fillers.

In many factories, certain woods are glue-sized. This is especially the case with mahogany veneers; and sometimes walnut veneers are sized, particularly where there is long open grain. The sizing is generally done before final polishing on the belt sander, although in some factories it is the first operation in the finishing room. In the latter instance, the furniture must be hand sanded after the sizing becomes dry.

The effect of sizing is to raise and stiffen the "loose" surface fibers of the wood, so that when sanded they will break off clean

without tearing. As a result a very smooth surface is obtained and any cross-grain scratches are easily eliminated. All glue should be removed from the exposed wood surfaces before starting to apply the finish. In many plants, glue spots are the cause of more finish removing and final patching than any other one thing.—W. L. DUNNING.

Degreasing Solvent

Two new illustrated leaflets describing the high stability of Perma-A-Clor degreasing solvent under adverse operating conditions, are now being issued by the Detroit Rex Products Co., 13035 Hillview Ave., Detroit, Mich. This chlorinated solvent is non-flammable and is used for cleaning all kinds of metal parts.

Films of Grand Rapids Convention

Films of the Grand Rapids A. E. S. National Convention are available for showing at branch meetings throughout the country after Sept. 15, 1942. They were taken by a professional and are offered to the members of the American Electroplaters' Society by The Lea Mfg. Co. as sponsors. The films are a silent version, 16mm and should be projected on Bell & Howell or Eastman 16mm silent equipment. The films are of about 15 minutes duration.

Anyone interested in showing these films should write to The Lea Mfg. Co., Waterbury, Conn., as far in advance as possible. There will be no charge of course for the films, the only request of the sponsors being that the people showing the films pay expressage both ways.

R. H. Clinton Joins Army Air Corps

Mr. R. H. Clinton of The Clinton Co. (Mfr. of finishing materials) Chicago, Ill., left Chicago Aug. 21, for Coral Gables, Fla., for training with the U. S. Army Air Corps, Intelligence Division.

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Experienced metal and wood finish salesman wanted for New England by an outstanding manufacturer in this field. Give full information with first letter. Address IF-901, care Industrial Finishing.

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We are looking for a man who can merchandise in the paint field; a man to direct the sales efforts of others; a man who knows the paint markets and the paint language. To a man who does give a damn, and to the man who gets things done, here is a job that will pay $5,000 a year to start, plus a bonus. Factory located in Baltimore, Maryland. The line consists of staple products, plastic coatings, and production finishes. If you are the man, then tell us about yourself fast and to the point. Job ready September 25th. Address IF-902, care Industrial Finishing.

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Index to Advertisers

Advance Paint Co. ..... Third Cover
Airose Chemical Co. 36
Aluminum Industries, Inc. 88
Arco Company, The 47
Ault & Wiborg Corp. 73

Berry Brothers 79
Binks Mfg. Co. 86-87

Campbell Co., M. L. 93-97-102
Chicago Eye Shield Co. 100
Claremont Waste Mfg. Co. 95
Classified Advertising 103
Crown Spray Gun Mfg. Co. 98

Day & Co., James B. 54
DeVilbiss Co., The 34-35
Dolan & Co., V. J. 5
duPont deNemours & Co., E. I. 52-53

Egyptian Lacquer Mfg. Co. 33

General Industrial Finishes 69
Glidden Co., The 61

Hilo Varnish Corp. 81

Industrial Chemical Development Corp. 6

Johnson & Son, Inc., S. C. 41

Keystone Varnish Co. 71
Koch Sons, Inc., George 65

Lawrence-McFadden Co. 101
Lilly Varnish Co. ..... Front Cover
Lowe Brothers Co. 49

Maas & Waldstein Co. 63
Mahon Co., The R. C. 39
Martin Varnish Co. 102
Mearl Corp., The 91
Meyercord Co., The 7
Murphy Varnish Co. 43

Neilson Chemical Co. 51
New York Woodfinishers Supply Co. 94
North Amer. Elec. Lamp Co. 97

Onyx Oils & Resins Inc. 103

Paasche Airbrush Co. 1
Perfection Paint & Color Co. 5
Pittsburgh Plate Glass Co. 10-11
Pulmosan Safety Equipment Corp. 99

Randolph Finishing Products Co. 100
Reliance Varnish Co. 85
Renner Co., Geo. W. 93
Rockford Varnish Co. 67
Ronan Co., Inc., T. J. 98
Roxalin Flexible Finishes, Inc. ..... Second Cover
Rudd Lacquer Corp. 96

Southern Varnish Corp. ..... Back Cover
Stanley Chemical Co. 75
Sterling Tool Products Co. 77
Stille-Young Corp. 9

United Lacquer Mfg. Co. 6

vanAllen Company, L. R. 94

Varnish Products Co. 8
Watson-Standard Co. 57

Yarnall Paint Co. 59

Zapon Division—Atlas Powder Co. 2
Zinsser & Co., Wm. 44-45

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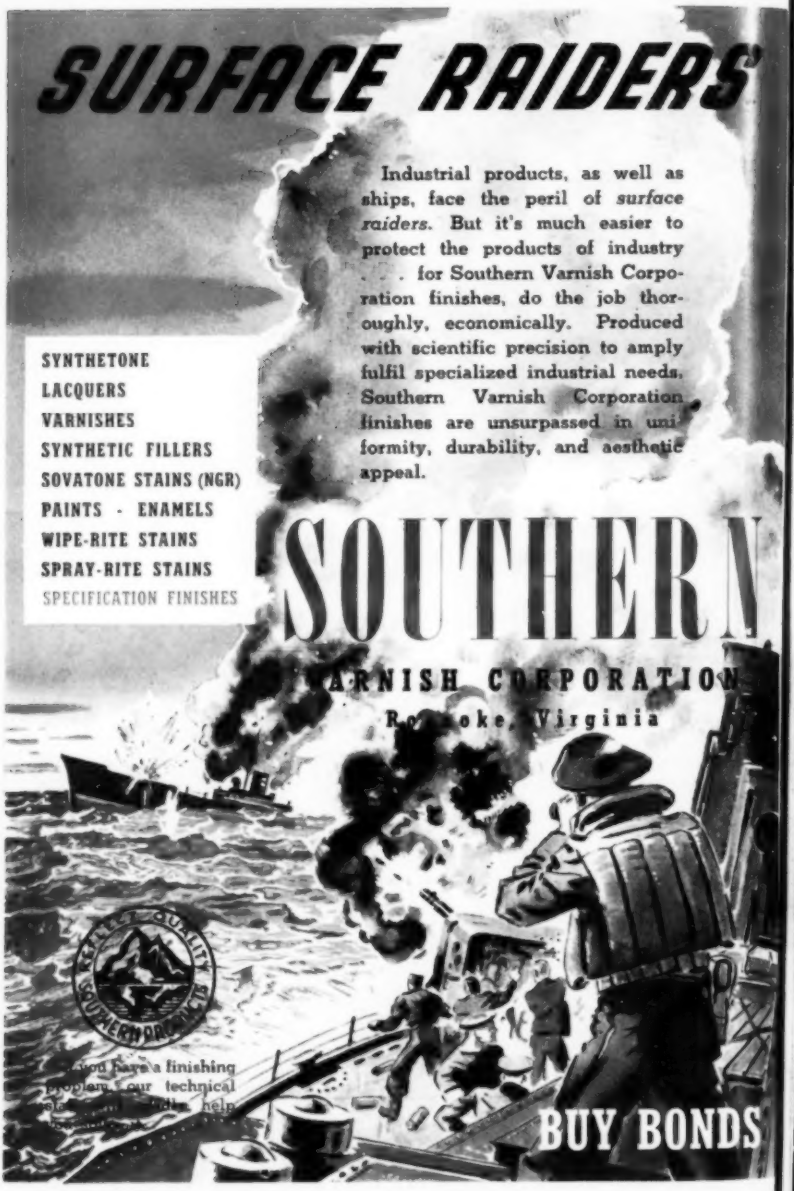
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